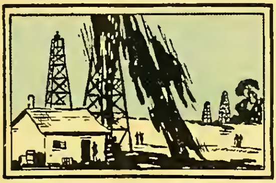
Louisiana Conservation REVIEW



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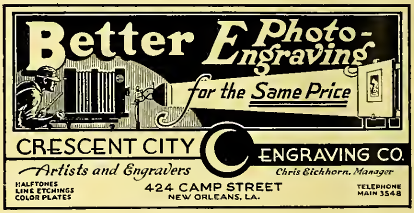

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VOL. VI NEW ORLEANS, LA., JANUARY, 1937 No. 1

FISHING

LOUISIANA offers marvelous opportunities for both sport and commercial fishing. Probably in no other state do more of its citizens participate in fishing as a recreation.

Fishing undoubtedly began as a utilitarian search for food. Primitive man, ignorant of agriculture, having no domestic plants and no domestic animals, sought his "daily bread" as hunter and fisherman. Many are the primitive devices used by various native tribes throughout the world to capture the finny food they desire.

When man became more stabilized in his existence, more skillful in the chase and in the arts of agriculture, there came a time when he could indulge in fishing as a sport. That sport has grown in importance until today while a mere 120,000 Americans annually engage in fishing as a livelihood, over 10,000,000 American anglers fish for fun.

Fishing offers compensations never realized by those who have never fished. Complications of business are forgotten for complications of reels and leaders and baits. Domestic restraints of speech and demeanor dissolved in the presence of other anglers equally free.

Adding to the troubles of the fish, the angler happily forgets his own. Recreational values have become increasingly important in American life. Many are the expressions of this desire for wholesome play out-doors, but few can match the satisfactions fishing brings.

Louisiana offers a unique fishing picture. Meshworks of bayous and lakes, a vast band of coastal waters, offshore marine fishing in "blue water", all lure. The peculiar and almost incredibly massive contribution of the Mississippi River to the Gulf of Mexico leavens the Gulf waters in ways that make them rich fishing grounds.

Every parish has its peculiar fishing attractions, its favorite fishing haunts.

Published quarterly by the Department of Conservation in the interest of protection and proper utilization of Louisiana's natural resources.

JAMES P. GUILLOT..........Editor
JAMES N. GOWANLOCH.........Assoc. Editor
ESTELLE V. COTTMAN.........Nat. Guar. Ed.

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Fishing has an etiquette all its own and a complexity of practice constantly increasing. Improvements in equipment and accessories afford almost endless avenues for experiment. Casting becomes an art of delicate achievements. It is of interest to note that a Norwegian professor recently conducted careful experiments which revealed that the speed of a cast line may attain a speed of 68 miles an hour so that when 35 to 38 yards of line are in the air both power and art are required to maintain velocity.

The Department of Conservation has by manifold activities endeavored to make more successful the fisherman's pursuit of sport. Fish hatcheries maintained by the Division of Fisheries provide a supply of best sport species, a supply distributed in public waters throughout Louisiana. Fish preserves restrict large natural areas to sport fishing so that overfishing is prevented and a game fish supply assured.

But game laws and fish hatcheries cannot alone insure the conservation of sport fishing resources.

Two things should be especially before the sport fisherman's attention: First, it is illegal in the State of Louisiana to sell any game fish whether such fish were caught within the boundaries of the State or elsewhere. Where they are offered for sale sportsmen should cooperate with the enforcement of the law. Second, there is no enemy more dangerous to good fishing than the "fish hog," the man who catches quantities of fish far beyond possible use that he or any of his neighbors can make of them. Disregard of limits is bad sportsmanship of the worst kind. It is the inherent duty of every sport fisherman to make the "fish hog" an unpopular non-sportsman.

The rewards of fishing have been recently well expressed by U. S. Commissioner of Fisheries Frank T. Bell when he said: "I can truthfully say that an insignificant percentage of the fishermen whom we encounter are actuated by any special concern as to the number of fish they bring home. When they return of an evening, literally peppered with insect bites, with clothing torn by briars or soaked by immersion, with an outstanding case of sunburn, with blisters, bruises and lacerations, and with all the other minor mishaps that befall the fisherman, they may proudly display the day's catch. Inside of a week, however, when the trip becomes a matter of memory, these memories are entirely concerned with the fun that was had and not with the hardships undergone."

The Department of Conservation of Louisiana strives by its activities to ensure for now and for the future the wholesome fun of "good fishing."

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Miscellaneous Geophysical Methods Used in Prospecting for Oil

By **V. GAVRILOVICH GABRIEL, Sc.D.**
Consulting Geophysicist and Geologist

and

CLARENCE P. DUNBAR, M.S.
Consulting Geologist and Petroleum Economist

(*Editorial Note. This article is intended to supply the reader with certain fundamental geological concepts and to discuss miscellaneous methods of oil prospecting which are not of sufficient interest to the general public to require special treatment. The author discussed "Seismic Prospecting in Exploration for Oil" in the October, 1936, issue of the* Louisiana Conservation Review. *It is expected that torsion balance and magnetic methods of prospecting will be discussed in later issues of the* Louisiana Conservation Review.)

The rapid growth of geophysical methods of oil prospecting is one of the most colorful examples of the use of scientific data and its varied application for many industrial purposes. The early mathematicians, physicists, seismologists, chemists, and geologists have all contributed something towards present day geophysics.[1] These early scientists were all keen observers of nature and the things about them, they recorded some of their findings and speculated as to the meaning and use of their observations, little realizing that some of their apparently unrelated findings would become the foundation for a billion dollar modern industry.

In view of the fact that this article is intended primarily for the general or non-technical reader, it is necessary that certain elementary geological concepts be presented before launching into even an elementary discussion of geophysical prospecting. Hence, for purposes of illustration assume that we have a rich layer cake (See figure 1) composed of layers of chocolate, jelly, and fruit. Now, if we apply two horizontal forces or pressures "F" to both sides of the cake the layers of the cake will no longer be horizontal (See figure 2) but will show irregular depressions and highs in case we are following any particular layer in the cake. Further, if we can imagine exchanging a layer of shale formation for the layer of fruit, a layer of sandstone for the layer of jelly and a layer of limestone for the layer of chocolate, we will have a rough picture of sedimentary formations underground. In geology we refer to underground highs as anticlines and to underground depressions or lows as synclines (See figure 2). We know from past experience that often anticlines, synclines, monoclines, salt domes (See figure 4), and faults (See figure 3) are associated with oil accumulation. Further, in many sections of Louisiana and Texas there are no surface clues or indications as to where these underground structures are located. Hence, it is necessary to use geophysical methods of prospecting in order to help locate these various types of structure which are favorable to oil accumulation.

There is no present successful method for the direct detection of oil beneath the earth's surface without drilling a well. However, since the direct detection of oil, as distinguished from the detection of favorable structures for oil accumulation, is the method that some unscrupulous men use in misleading the general public, it seems appropriate to quote from Dr. Blau's excellent article[2] entitled "Black Magic In Geophysical Prospecting".

> "The rapid growth of the oil industry, and the high profits derived by the more fortunate land and royalty owners which are often found by drilling on hitherto relatively worthless land, have so preyed on the imagination of some would-be inventors and miracle men, that hardly a month passes without news of the invention of a purportedly reliable oil finder . . . It is characteristic of these inventors that they stress emphatically the fact that they have never studied any exact science . . . Another great talking point is that they have worked on the invention for many years, rarely fewer than 10 and often 17 to 20, the number depending somewhat on the age of the inventor . . . A third point which is generally emphasized is that the invention has been submitted to great university scientists who were, however, un-

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[1] The authors wish to thank the Schlumberger Well Surveying Corporation for providing material describing electrical coring and electrical measurements in drill holes and for providing the figure illustrating their method of operation. They also wish to thank Miss Frederica Killgare and Mr. J. A. Gerson of Houston, Texas, for assistance in preparing the typescript.

[2] L. W. Blau: "Black Magic in Geophysical Prospecting", Geophysics, Jan., 1936.

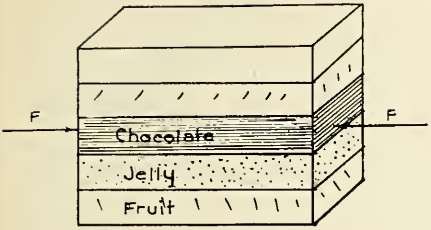


Figure 1

able to understand it . . . It is further characteristic of the devices that, whatever quantity may be read, the reading is generally high on oil or gas fields.

"There are, roughly, five different principles which seem to be most useful in the design of oil finders. First, oil, gas, sulphur, even lime and granite, emit corpuscular radiations which can be observed by means of instruments at the surface of the earth. Second, the minerals which it is desired to find radiate vibrations which react upon the observer and enable him to locate them. Third, substances do not attract according to Newton's law, that is the force of attraction is not proportional to the product of their masses and inversely to the square of the distance; the force of the attraction is alleged to vary with the chemical constitution of the substances and there appear to be grave doubts also, to the effect that the exponent in the denominator is much, very much indeed, too large. Fourth, oil and gas send out electro-magnetic waves which can be received with a sufficiently sensitive and properly tuned radio receiver. Fifth, organic substances exhibit sexual characteristics; sex, being one of the stronger emotions, can therefore be very profitably exploited in oil prospecting if the proper technique is employed."

Needless to say there have been many honest scientific men who have attempted to work out some practical workable method for the direct detection of oil. The work of Bogoyavlensky[3] with radium illustrates this point.

Many rocks carry a small amount of radium. Radium is not a stable element but by losing particles (helium atoms minus two electrons), electrons carrying charges of negative electricity, and by radiation it goes through many transformations to its final product lead. Further, radium of the uranium group after losing electrons and radiation goes to "radium emanation" or "radon". Radon has an affinity for oil and is usually absorbed and retained by oil. In 1928 Bogoyavlensky found an increase in radioactivity over the very shallow oil pools (less than 50 feet in depth). Unfortunately there are very few shallow oil pools existing this close to the surface of the ground.

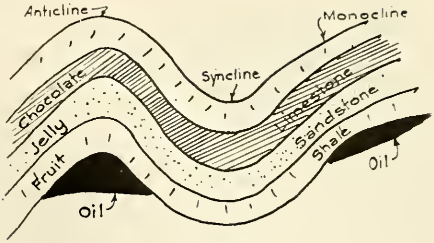


Figure 2

Botset and Weaver,[4] and Howell[5] found that in the area covered by their investigations in Texas that there is no correlation between an increase in radioactivity and an underground structure (fault).

Sedimentary formations have a very wide range in electrical conductivity. The presence of water diminishes electric resistivity and makes formations more conductive. The presence of dissolved salts in water greatly increases conductivity. Many formations have a certain range of conductivity (resistivity) and hence can be detected by some electrical methods. Electrical methods of prospecting are not very widely used in Texas and Louisiana at the present time.

However, the electrocoring method of Schlumberger has a wide application in the correlation of geological formations and in the detection of oil and gas saturated layers in wells already drilled. As was explained before, rocks have a wide range in electrical resistivity (conductivity) due to the presence of a variable amount of water and dissolved salts. Moreover, the movement of fluids filtering through porous media develop electromotive forces. This process is called electrofiltration. In oil or gas sands resistivity and electrofiltration phenomena are very pronounced. By his ingenious method Schlumberger was able to express graphically these changes in resistivities and "porosities" (electrofiltration) through the entire depth of a drilled well. Schlumberger[6] gives the following description of his method of determining resistivity and porosity as illustrated in figure 5:

---

[3] L. N. Bogoyavlensky: "Radiometric Exploration of Oil Deposits", U. S. Bureau of Mines, Circular No. 6072, 1928.

[4] H. G. Botset and Paul Weaver: Physics, Vol. 2, p. 376, 1932.

[5] Lynn G. Howell: "Radioactivity of Soil Gases", Bull. Am. Assoc. Pet. Geol., Vol. 18, No. 1, 1934.

[6] C. and M. Schlumberger and E. G. Leonardon: "Electrical Coring; a Method of Determining Bottom-hole Data by Electrical Measurements," Transactions A. I. M. E., Volume 110, pp. 239-240.

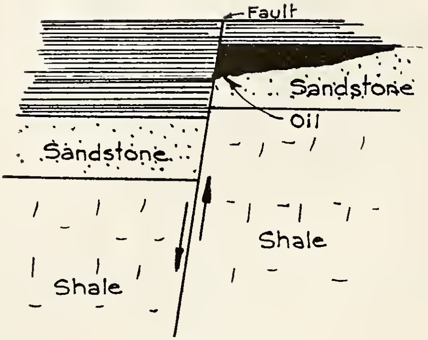


Figure 3

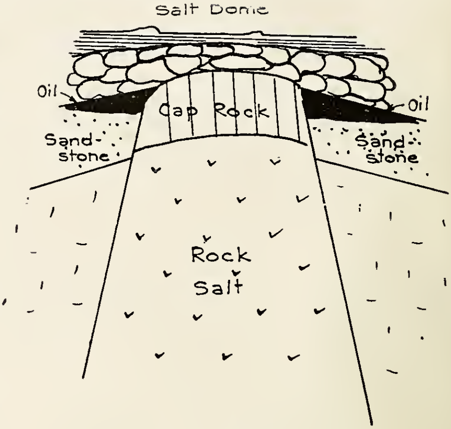


Figure 4

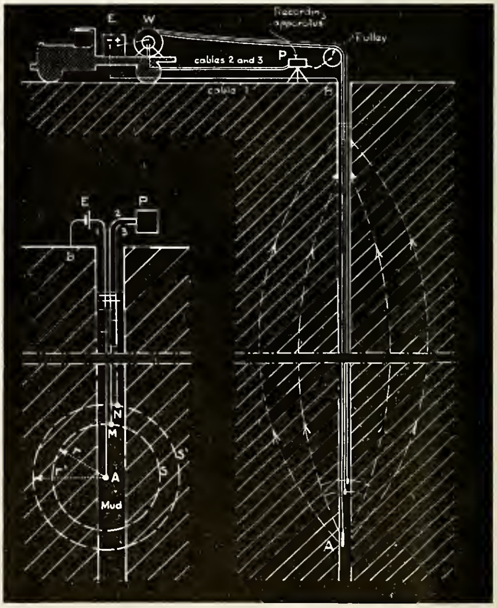
"The measuring device usually employed is shown in figure 5. It comprises three insulated cables, 1, 2 and 3, which are lowered into the drill hole. Three electrodes, A, M and N, are attached to the lower end of these cables and dip into the water or mud filling the hole. The distances, AM = r and AN = r′, are supposed to be large in comparison with the diameter of the hole; they are, for instance, 10 to 20 times greater. The electrode A is used to send the current into the ground and electrodes M and N to measure the difference of potential caused between these two points by the passage of the current through the ground.

"In order to cause the current to flow into the ground, the electrode, A is connected by means of an insulated cable, 1 to one of the poles of a battery, E, located at the surface, of which the other pole is grounded to any given earth contact, B, in the vicinity of the drill hole. The casing frequently constitutes the second ground, B. In order to measure the differences of potential between M and N, these electrodes are connected by means of two insulated cables, 2 and 3, to the terminals of a potentiometer, P, located at the surface. Knowing the distances, r and r′, the intensity, i, of the current passed through the ground, and the difference of potential, △ V between M and N (which is measured by the potentiometer), the average resistivity of the ground, R, in the region of the measuring arrangement, AMN, can be calculated."

Porosity and resistivity values are recorded graphically as the cable is raised and lowered in the hole. The survey of a deep oil well requires approximately five hours.

There is an increase of temperature with depth from the earth's surface down, at a rate of approximately 1° C. for each 100 feet. Further, rocks do not conduct heat at the same rate and even in the same formation the rate of conduction of heat depends upon the direction and the structure. Hence, by observing temperatures in many different wells at various depths and connecting the points of equal temperature lines of equal temperature or isothermal lines are obtained for mapping purposes. Generally, isothermal lines

(Continued on Page 24)



Original scheme of electrical logging device designed by Conrad and Marcel Schlumberger. *(Illustration through the courtesy of the Schlumberger Well Surveying Corporation, Houston, Texas.)*

Is the Paper Industry Moving South?[*]

Southern Pine Challenges King Spruce for the Crown of the Paper Kingdom

By JOHN F. PRESTON

(Editorial Note. John F. Preston is in charge of the forestry work of the Soil Conservation Service, with headquarters at Washington, D. C. A native of Iowa, he was graduated from the University of Michigan and entered the Forest Service of the United States Government giving eighteen years to this work in the West. Mr. Preston was, prior to his present connection, forester for the Hammermill Paper Company for over ten years. Thoroughly familiar with the pulp and paper industry, few are better qualified than he to appraise this romantic new development that seems to offer a harvest of gold from Southern pine. For a process has been evolved for the production of pulp from a source hitherto found impractical—a process which threatens the crown of King Spruce of the North, till now unchallenged ruler of the pulpwood world. Read his story.)

For close upon a hundred years, spruce has been king of American pulpwoods. From his domain in the north where his subjects peopled the hills and valleys from the ocean to the plains he has gathered into the hollow of his hands America's paper industry. He has fostered it to industrial greatness and built around himself an empire of capital investments that run into billions of dollars.

Comes now a new contender—the fast growing pine of the South—to hurl an economic challenge to King Spruce and his dynasty of pulp mills and to raise the question: Are his days numbered with the seeming certainty that hangs over kings of flesh and blood?

The question is pertinent because there is a growing belief that America's pulp industry is on the brink of a general exodus from the North to build a new industrial empire in the South. Progressive developments in pulp and paper-making technique have, it is claimed, opened the paper-making world to the South with its millions of acres of rapidly growing pines, cheap labor and other economic advantages. The increasing number of pulp mills that have been built in recent years or are now building in the South give color to the picture and substance to current claims that the secret of making white papers, including newsprint, commercially has been solved, that the industry already is on the move southward and that it is only a question of years until the pulpwood crown will pass to the pines of Dixieland. Are these claims well founded? Is there reason to believe the many other stories now current about the imminence of pulp and paper development in the South? What are the real facts? In a recent trip through a portion of the South I tried to arrive at a sensible, reasonable and impartial conclusion.

In appraising the possible swing of the industry, it must be borne in mind that the pulp and paper industry practically grew up on spruce, balsam and hemlock,—woods which seemed to have inherent qualities preeminently setting them apart as pulp species. The first chemical process (about 1850) for converting wood to pulp was the soda process, adapted to cooking short fiber woods such as aspen and hardwoods; the product was bulky and lacked strength, but was suitable for book and magazine papers. The development of the sulphite process, (about 1883) however, really established the paper industry as a large-scale business and it was this process, dependent as it was on spruce, balsam, and hemlock, which caused such a concentration of the industry in the Northeast where these woods grew. The book and magazine paper mills also concentrated in the Northeast partly because aspen, the chief of the soda pulp species, was most abundant here, and partly, of course, in both cases, because of near-by markets. Usually, too, more or less sulphite pulp made from spruce is added to the soda pulp to provide the necessary strength.

Spruce was also adapted to grinding,—a method in which the entire log was made into pulp—whereas by the chemical process only the pure cellulose, which is usually less than one-half the dry weight of the wood, is used. The pure chemical pulp is used in making the higher grades of white paper such as writing, ledger and general office forms and, in combination with the ground wood pulp, is made into newsprint paper. Spruce offered no difficulties in bleaching, was fairly free from pitch trouble and the fiber was flexible and easily meshed. The paper industry therefore built its empire on a spruce foundation with balsam and hemlock as acceptable but less desirable substitutes.

In the United States a spruce-fir-hemlock belt extends from Maine westward through the Lake States and in Canada to the northern latitude of tree growth. This spruce belt in the United States coincided well with the center of population and the market for paper. It was natural therefore that the paper mills were first built in this spruce belt and are still much concentrated there.

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[*] *Courtesy, AMERICAN FORESTS, the Magazine of the American Forestry Association.*

Partial exhaustion of the spruce forests in the northeastern United States caused the building of mills in adjoining Canada and on the Pacific Coast, most of which were spruce mills.

Meanwhile, another important chemical process was perfected, known as the sulphate process. This process was soon found to be very useful in converting into pulp the abundant and cheap pines, especially the southern pines. The large volume of pitch characteristic of pine trees was successfully dissolved by this method. The

Virgin pine forest showing turpentining process.—Vernon Parish, Louisiana.

resulting pulp, however, was difficult as well as expensive to bleach, so the product was chiefly unbleached wrapping paper or boards of a natural brown color, which came to be known as kraft paper.

For a time the paper industry seemed to settle down, more or less contentedly, with each class of product and process more or less distinct. Spruce dominated the pulp field and seemed secure as the "King of the Pulpwoods." In spite of the increasing use of other woods, spruce, fir, and hemlock still constitute about seventy per cent of the pulpwood used in the United States. The newsprint industry gradually moved across into Canada where water-power and spruce were cheap. A few newsprint mills were built in the West and of course a considerable number remained in the northeastern United States. The "white paper" industry—meaning usually the products resulting from spruce wood cooked by the sulphite process—remained fairly stable since the higher priced product permitted hauling wood a considerable distance to the mill. Sulphite mills appeared in Canada and in the West but the major portion of the industry stayed "put." The South had its kraft mills but very few making other products.

The South having no spruce except extremely limited quantities in the Appalachian Mountains, its paper industry was a one-product business. The cry was for diversification and that meant solving the problems of making "white" papers from pine—a very pitchy pine at that—and from hardwoods, chiefly gum. A laboratory method of making "white" paper from pine was developed by using a modification of the sulphate process, and by the sulphite process, but its use commercially did not materialize. Then the Chemical Foundation, in cooperation with the State of Georgia, established an experimental pulp and paper laboratory at Savannah, Georgia, under the direction of Dr. Charles H. Herty.

As a result of experiments at this laboratory it is now claimed that the problems have been solved. As evidence, an edition of nine Georgia papers was recently published on newsprint paper made from Southern pine at the Savannah laboratory and a northern newsprint mill. The sulphite process, it is claimed, can be used in converting Southern pine into pulp by selecting only trees without heartwood, because there is practically no pitch present in such trees. The northern paper mill which made the newsprint out of Southern pine pulp ran for eight hours and reported no pitch trouble.

Other claims are made by enthusiasts in the South as to the large area of commercial timberland, the rapidity of growth of pine trees and the tremendous yields to be obtained in "managed" forests of Southern pine. It is not diffi-

All native pines may be raised easily and cheaply in the nursery. Only one growing season is required and the seedlings when transplanted to the field succeeded very satisfactorily.
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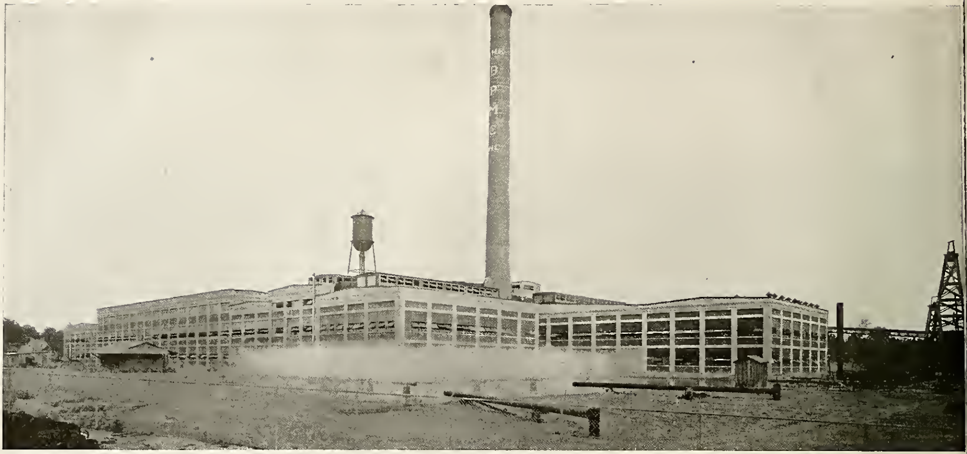


One of the more modern pulpmills in Louisiana, depending upon the new forest growth.

cult to show that the combination of rapidly-growing trees and large areas of forest land will produce sufficient quantities of pulpwood to supply the world's requirements for paper of every grade, and at a price so much cheaper than it can be produced elsewhere, that it is easy to conclude the pulp and paper industry will soon move bag and baggage to the land where Southern pine grows.

In a recent publication of the Chemical Foundation called "The Deserted Village" growth figures for the southern pines are quoted from a circular of the United States Forest Service as follows: In fully stocked stands at twenty years of age the yields of pulpwood to be expected on an acre are, for longleaf pine, fifteen cords; shortleaf pine, eighteen cords; loblolly pine, twenty-eight cords; and slash pine, thirty-six cords. These are, of course, theoretical figures not obtainable over extensive areas even under the most intensive management. They do, however, indicate the relative growth and yield of the four principal southern pines. In the same publication an eminent pulp and paper engineer from Canada is quoted as saying that 300 square miles of southern pine land will produce pulpwood to supply a 500 ton newsprint mill while the same mill now requires 2,000 square miles of Canadian spruce land. The relation is almost one to seven in favor of the South.

There is no question about the large area of timber-growing land down South. The present stand of timber is, however, disappointingly light with very considerable areas of denuded and waste land. Everywhere, fires burn through the woods year after year and it is surprising to find that any forest can survive such treatment.

Fortunately we have actual figures to show the existing stand of timber in the South. The Southern Forest Experiment Station, of the Forest Service, has published the results of an actual survey of 68,000,000 acres in the "deep South" from Texas to South Carolina. About sixty-eight per cent was found to be forested and the average stand suitable for pulpwood was four and two-tenths cords of pine and two cords of hardwood. However, if that part of the pine stand "in trees that are now being worked for naval stores or are considered likely to be worked in the future" are deducted, the net stand on the average acre is reduced to two and six-tenths cords. In other words, the existing stand of pine timber suitable for newsprint or white paper is two and six-tenths cords for an average acre, which is a pretty thin crop. There is no shortage of hardwoods for pulpwood North or South, at least so far as concerns present or prospective demands for pulpwood; it is only the softwoods that are really important.

Although it is possible to grow very much larger volumes of southern pine timber than are now growing, it seems improbable that the transformation can be brought about within several generations. Growth in certain instances, it is true, is quite phenomenal. Examples of natural second growth slash pine can be found which are merchantable for naval stores in twelve to fifteen years, that is, where the stands have been thinned so as to give individual trees plenty of light. However, such growth, as every forester will admit, is unusual and must be considered far above the average. On the Oceola National Forest in Florida which contains 150,000 acres of the better class of forest-growing land, a period of twenty-five years is allowed in which to grow a pine tree on the average site to nine inches.

I find that the most optimistic forester considers a growth of one cord an acre a year as much as he should estimate on a property of 100,000 acres, assuming successful fire protection and the practice of intensive management. Others, more conservative, estimate not more than one-half this growth.

I would conclude that the relation between growth of spruce in the North and pine in the South was more nearly one to two rather than one to seven as reported in "The Deserted Village." This is a decided advantage for the South but is well within the bounds of reason.

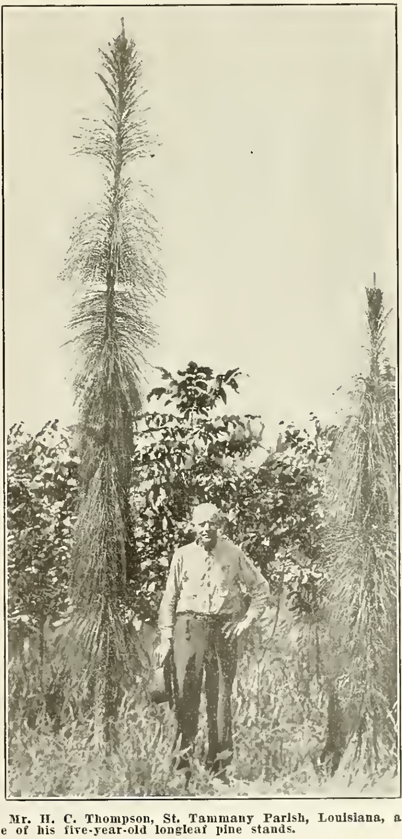
Absence of heartwood in pines is reported by Dr. Herty as essential to permit their use in the ground-wood or sulphite process. In the naval stores belt which includes approximately one-half the timberland of the South it is questionable whether or not good management for naval stores will permit thinning the stands at a stage where the thinnings will be in trees large enough to make pulpwood. Naval stores are the money crop. To get maximum production requires an orchard-like stand of trees with full crowns. Frequent and drastic thinnings in the early stages seem to be indicated and are called for in some of the management plans. If pulpwood thinnings are contemplated, they will probably be obtained at considerable sacrifice of naval stores production. After turpentining, heartwood has formed and the trees are unsuitable except for sulphate or kraft pulp. Therefore, a paper mill requiring pulpwood from trees without heartwood would probably be inclined to locate outside the naval stores belt or be prepared to pay a premium for its wood.

The cost of pulpwood in the South is reported to be about $4 a cord at the mills for rough wood. In some instances such low prices do prevail but usually they represent starvation wages and often such costs as overhead, scaling and unloading at mills are not included. What would be a reliable figure upon which to base an investment of ten million dollars, which is about the cost of a fair sized paper and pulp mill? Certainly not as low as $4 a cord. Living wages must be paid for producing pulpwood; the spirit of the times demands it. Furthermore, the owner of stumpage is now getting very low prices for his wood. In the long run, he must have a fair return to justify his effort in growing the wood. The requirement that only sapwood be used will necessitate sorting or careful selection of wood. Current prices are for wood suitable for kraft paper; pulpwood to be used in the sulphite process requires higher specifications as to defects. Lastly, if any considerable development of mills takes place, competition of buyers will tend to raise prices.

What will be the price of wood which could be reported to a Board of Directors as a safe figure in reaching a decision whether or not to build a $10,000,000 pulp mill to make "white" paper?

Some foresters argue—and very convincingly—that ownership of a forest property located in close proximity to the mill, and managed inten-

(Continued on Page 25)



Mr. H. C. Thompson, St. Tammany Parish, Louisiana, and one of his five-year-old longleaf pine stands.

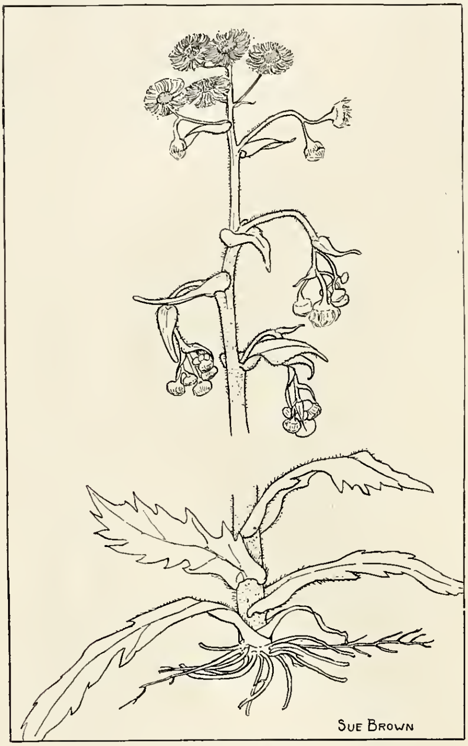
Some Wild Flowers of Louisiana

Part VIII

Four Spring Flowers

By
CLAIR A. BROWN
Associate Professor of Botany, Louisiana State University

It seems desirable at this time to add to the spring flowers previously presented in the *Louisiana Conservation Review.* A number of the more common plants were illustrated in former issues and these are largely supplementary to those previously illustrated. (Volume IV, January, April, 1935.) These are deemed worthy of presentation because they are early spring flowers which are widely distributed in Louisiana and will still be in bloom at the time this note is published.



DAISY FLEABANE

***Erigeron philadelphicus* L.**

Composite Family **Compositae**

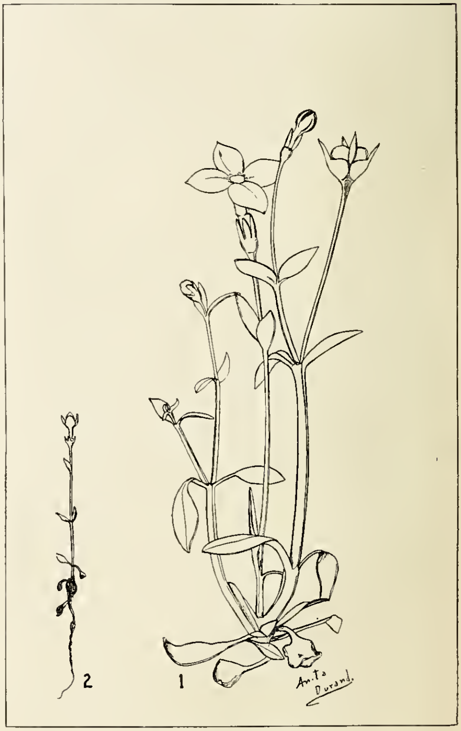
The rosettes of light green leaves are found in early November, and the plant continues grow all through the winter months if the weather is not too cold. Usually a flowering stalk is sent up during the later part of February or early March. The first plants are quite dwarfed as compared to those which make their growth under warmer conditions. This plant is so abundant that it can be classed as a weed, for it thrives in weedy habitat, roadsides and waste places, and it likewise occurs in lawns and gardens where it is a nuisance.

It is a perennial herb from six to thirty inches tall, with a basal rosette of oblong coarsely toothed leaves. The leaves and stem are covered with a soft hirsute pubescence. The flower heads contain ray and disk flowers. The ray flowers are very numerous with small white to pinkish strap-shaped corollas, surrounding the mass of yellow disk flowers.

It blooms from February into April. Frequently seedlings which have started their growth in the fall will act as winter annuals and bloom the first season.

It is widely distributed in Louisiana and is particularly abundant on the alluvial and bluff soils.

Explanation of Plate: Figure about one-half natural size.



BLUETS, INNOCENCE

***Houstonia patens* Ell.**

Madder Family **Rubiaceae**

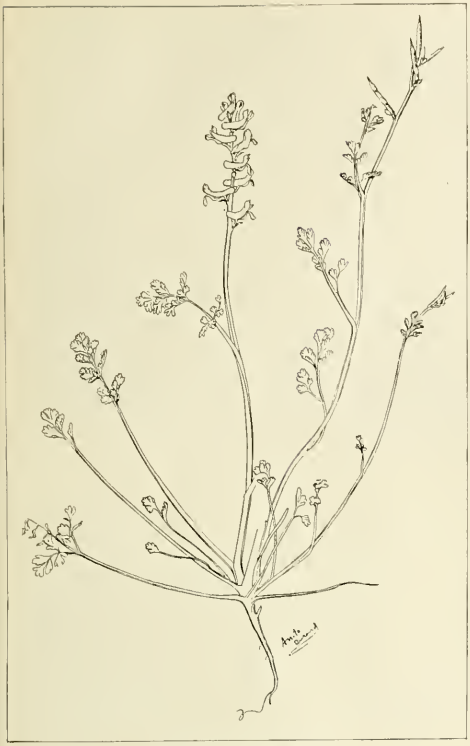
Bluets are well known and admired by many. They are often so well hidden among taller plants that they would be missed entirely if it were not for their conspicuous blue flowers. Oftentimes they are so abundant in lawns that the lawns appear to be carpeted with blue flowers.

These tiny, annual plants vary from one inch to six inches in height. The opposite leaves are very small, often less than one-half an inch long. A tiny blue flower is borne at the top of the stem and on the tip of each of the few branches. The corolla is united into a tube which spreads out at the top into four lobes, each about one-quarter of an inch long. The fruit is a small, heart-shaped capsule.

The plant blooms in early spring, February to March.

Widely distributed in Louisiana on the drier soils.

Explanation of Plate: Fig. 1. Branched plant. 2½ times natural size. Fig. 2. Unbranched plant. One-half natural size.



HALE'S CORYDALIS

Capnaides Halei **Small**

Fumitory Family **Fumariaceae**

This plant was named after Josiah Hale, one of the early botanists in Louisiana. He cooperated with J. L. Riddell and William Carpenter in the publication of "Catalogus Florae Ludovicianae" in the New Orleans Medical and Surgical Journal, Volume 8, 743-764. 1852. They listed nearly 1800 species and varieties for Louisiana, which probably represents about one-half of our flora.

Hale's Corydalis is an attractive plant with racemes of golden flowers and pale green, finely divided leaves. The plants are called fumeroots or fumeworts because of the nitrous odor of the roots. It deserves a place in our gardens.

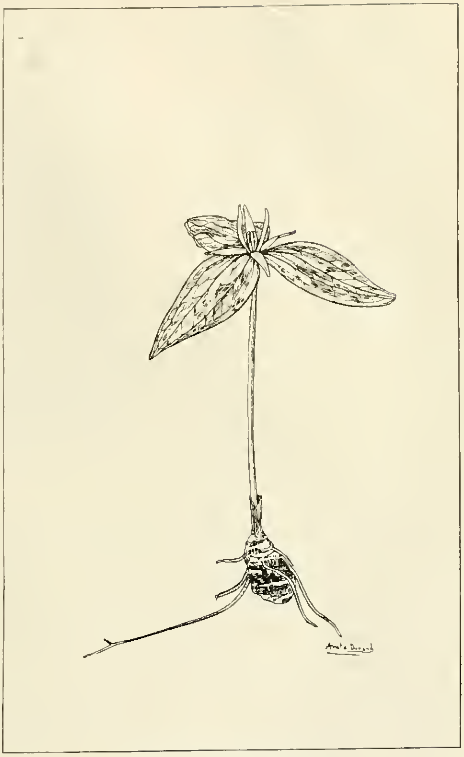
Several ascending stems, less than a foot high, arise from the crown of this herb. The leaves are finely divided and are conspicuous on account of their pale, glaucous, green color. The pale yellow flower is irregular in shape and is composed of four petals. One of the outer petals is prolonged behind the flower into a small, blunt spur. The calyx is reduced to two tiny whitish scales. The tiny, shiny, black seeds are produced in a short, slender pod.

It blooms from late February until April. The plants vanish after warm weather arrives.

Widely distributed in Louisiana, especially on old cultivated fields and waste places.

Capnoides Halei is closely related to ***Capnoides aureum*** from which it is said to differ by the wing-like crest to the hood of the outer petals, whereas the hood of ***C. aureum*** is merely keeled. ***C. Halei*** is a coastal plains species and ***C. aureum*** according to Small's manual occurs north of the coastal plains.

Explanation of Plate: Figure about one-half natural size.



RED-FLOWERED TRILLIUM

Trillium sessile **L.**

Lily Family **Liliaceae**

The warmer days of late winter awake the trillium to a quick growth and the mottled green leaves come peeping through the blanket of dead leaves. Nestled close to the leaves is a bud which expands into a dark red flower. A clump of these flowers is a joy to behold, but the odor of the flowers is inviting only to insects like the carrion flies.

The bulb of this plant is really a stem, technically called a corm. Plants with this type of an underground stem often do not survive if the leaves are removed. The leaves manufacture food which is stored in the corm to be used for rapid growth the following spring, and if they are removed, the stem may not contain enough food for this growth.

Many plants which are in danger of extermination have stems of this type.

Three drooping, mottled green leaves are borne on the top of a naked stem-like structure from four to eight inches high. Sessile in the center of these is the dark red, ill-scented flower.

They bloom from February into April.

Widespread in rich, shady woods.

Trillium sessile has petals which are not narrowed into claw-like bases and are usually of a uniform color. ***Trillium ludovicianum,*** a closely related species differs in having the petals with claw-like bases which are sometimes differently colored from the blades. The writer has had extreme difficulty in trying to separate these species. Everything collected has been apparently ***Trillium sessile.*** Material under observation had the newly opened flowers a uniform color, and as the flowers aged the bases of the petals became greenish. Occasional specimens have been seen in the field with greenish bases to the petals, but the petals were not narrowed at the base.

Explanation of Plate: Figure nearly one-half natural size.

The Beaver, Foremost Wildlife Citizen

By WILLIAM L. FINLEY

(EDITORIAL NOTE: *The following discussion concerns one of North America's most interesting mammals, interesting not alone because of the fact that the search for the beaver's valuable fur led to revealing and historically important explorations, but likewise interesting because of its own extraordinary habits and abilities.*

The beaver, thanks to the efforts of the Department of Conservation, is increasing the population of its colonies in Louisiana.)

In the West where forests, streams and snow-clad mountains lie just beyond the centers of population and where primitive areas are not all destroyed, interest is growing stronger toward the public use of the out-of-doors for health and happiness. Commercialism is still driving to make money by rapid exploitation. Can we check the quick private profits on natural resources that have been running the people's account into the red?

Who is to watch the public's interest in our wildlife resources when they are wasted by greed and carelessness? The average citizen hasn't the time, and what is everybody's business is nobody's business. Education must be used as the key to conservation. The children of today must straighten out the tangles of tomorrow.

To the promoter and exploiter, all our wildlife resources have had but one use, killing for profits of some kind. The conservation history of America reveals many examples of killing the goose that laid the golden egg, the most striking of which is the trappers' campaign against the humble beaver to get quick profits on his hide. It is very much like making a stew out of a productive hen or a roast out of a fine milk cow. Nature's engineer, the beaver, has a good warm coat, but his greatest service has been in creating our earliest industry of conserving soil and water. In the West he has proved to be the most valuable wild animal in existence and one that built up a vast amount of wealth.

Louisiana Beaver (*Castor canadensis carolinensis* Rhodes). Photographed from a mounted specimen in the Louisiana State Museum.

As a conserver of soil and water the busy beaver is more logical and toils with a more persistent purpose than man in building dams. Both have the same incentive, to store up water. A beaver dams a stream to create a moat around his house for protection. Man dams a stream to create a reservoir for irrigation and power. In this day and age when western people are so conscious of dams the beaver ought to be crowned as our wildlife citizen number one, because in arid areas he builds reservoirs to save water without cost, while man is building enormous dams to store up water, but saddling future generations with gigantic debts.

A long time ago when the great mountain ranges were lifted up from the Atlantic to the Pacific, the rains came and the floods swept down the gullies and canyons, washing the rich top soil to the sea. Then the beavers moved in, building dams along all the little streams, stopping the rush

A dam constructed by the Louisiana Beaver on the Amite River in St. Helena Parish.

With no beaver engineers left to take care of the dams, the ponds disappeared. Grassy meadows built up by sub-irrigation died out. Instead of 15,000 tons of pasturage along the streams, worth $3 to $5 a ton, the amount was reduced to a few hundred tons. Each year the water supply lessened. Good trout streams disappeared. Ranchers had to dig wells and pump water for their stock. Farmers lower down who had used the water for irrigation watched their ranches revert to a desert.

The trappers in one season cashed in their catch for $4,000 or $5,000. This may be compared to a continual yearly loss to stockmen of approximately $50,000. It has now run into hundreds of thousands. The proof is plain that a dead beaver may be worth $10 or $15, while a live one is worth $300.

Perhaps a better example of the loss of water, which means the destruction of wealth, is shown along Ochoco Creek and its tributaries. Approximately $1,425,000 were spent on the Ochoco Dam to create a reservoir for the Ochoco

(Continued on Page 26)

of waters, and the soil settled to the bottom. Ponds filled up with silt, turning into meadows; more ponds and more soil developed from little to big valleys, getting the whole topography of the country ready for man's arrival and benefit. The water table was built up from its sources. Forests were fostered and conserved moisture in the sponge-like soil. Innumerable ponds and lakes made homes for fish life, waterfowl and fur-bearing animals. Streams grew and fed rivers to irrigate the lower stretches of the land.

The proof today is clear that a beaver's value is in his work and not solely in his hide. The facts have been uncovered in thousands of areas in the West. Beavers were trapped out, ponds and lakes dried up, the water table lowered, and grass-covered valleys reverted to deserts. Soil erosion and dust storms followed which are the tragic pictures of today.

Let me give you an example. Two trappers took out 600 beaver pelts one winter from the headwaters of Silver Creek and its tributaries in the southeastern part of the Ochoco National Forest in eastern Oregon.

Typical work of the Louisiana Beaver in St. Helena Parish.

Damage to Young Pines by a Leaf-cutting Ant, *Atta texana* Buckley, in Louisiana

By THOS. E. SNYDER, Senior Entomologist, Bureau of Entomology and Plant Quarantine,
United States Department of Agriculture.

During the last few years the leaf-cutting ant, *Atta texana* Buckley, has caused considerable losses of young longleaf and slash pine trees over large areas in several localities in Louisiana. This killing of young pine trees has occurred both in newly planted areas and in natural reproduction. While this ant has been known as a pest of agricultural crops and fruit trees, it has not hitherto been recorded as an enemy of young pines. As a result of field investigations conducted in 1935 and 1936, biological data of interest regarding the ant have been obtained, and after preliminary experimentation a satisfactory method of control has been put into effect.

This paper discusses the ant, its habits and distribution, its injury to young pine plantations and to natural reproduction. The injury and the method of control in plantations and those under natural regeneration in the forest differ and are therefore discussed separately. The report on control is based largely on the work of forest officers who have followed the advice of the Bureau of Entomology and Plant Quarantine, and in this connection special credit should be given to J. D. Nellis, B. C. Gyure, of the Kisatchie National Forest, and C. A. Bickford, of the Southern Forest Experiment Station. While the investigations are not complete, the results already obtained should be useful to foresters in this section.

DESCRIPTION OF THE ANT AND ITS GENERAL HABITS

The leaf-cutting or parasol ant (*Atta texana* Buckley) was described[1] in 1860 by Buckley, who gave a general account of its life history and habits. It is locally called the "red town ant." In Texas this ant has also been studied by W. D. Hunter[2] and E. V. Walters, of this Bureau, although the report of the latter is at present in manuscript form and not available.

There are several different forms, or castes, in the colony or nest of this ant—soldiers, large and small workers (fig. 1), and the winged males and females. There is a definite division of labor. The soldiers, with enormously developed heads and jaws, defend the nest and protect the workers when they are foraging. The large and small workers gather leaves for the fungus gardens and prepare these gardens in deep subterranean galleries. Ants of this species do not eat the leaves that they cut but use them as a bed upon which to grow the fungi they use as food.

Nests of this ant occur frequently in widely scattered local areas in Louisiana (fig. 2). The surface indication of the nest is a low mound about 18 inches in diameter. Owing to the fact that nests are usually excavated in white, sandy soil, the mounds are quite a conspicuous feature of the landscape. These ant mounds superficially resemble the mounds made by gophers and other small burrowing rodents when digging their underground dens. There are several openings to the main ant nests, ranging from a few holes up to several hundred. In the latter case the entire nest may cover an area of about 1 acre. The supplementary openings are for ventilating the deep underground passages.

In February of 1935 attempts were made to dig nests out but they could not be located at depths carried to more than 4½ feet. Later efforts to locate the central nest were unsuccessful, even after digging as deep as 12½ feet in this easily penetrated soil. The centralized chambers are far from the entrance holes—often as much as 20 feet. This affords protection from rain and renders control measures difficult except where

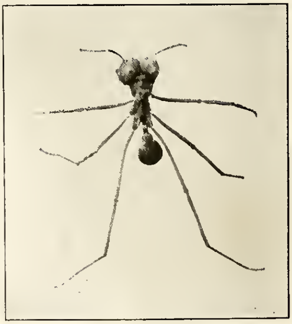


Figure 1. c. Worker enlarged 4 times.

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[1] 1860. Buckley, S. B. The cutting ant of Texas, Acad. Nat. Sci. Phila. Proc. 12: 233-236.

[2] 1921. Hunter, W. D. Two destructive Texas ants. U. S. Dept. Agr. Bur. Ent. Circ. 148, 7. pp.

fumes are used.

The ants' first preference for their cutting work seems to be green oak leaves; the next, pine needles; and they do not cut much grass or weeds. After the new oak leaves come out late in the spring, injury to young pine trees ceases. Unfortunately, however, planting operations are carried on from December thru February in the early spring, when there are no green oak leaves. The plantations where damage occurred are all in fire-protected areas, and much of the grass early in the spring is brown.

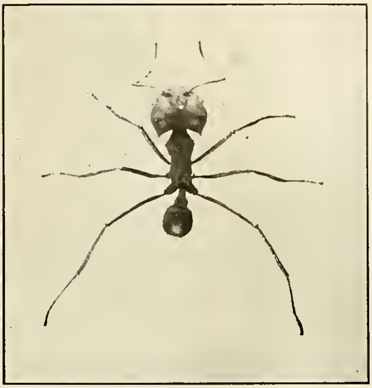

Figure 1. b. Soldier enlarged 3 times.

This ant is active throughout the greater part of the year but remains in the underground nest during the colder periods. In very hot weather it is inactive during the day but comes above ground at night. The foraging expeditions may extend to a distance of from 150 to 200 feet from the main nest.

DAMAGE AND HABITS IN PLANTATIONS

On the Evangeline Planting Unit of the Kisatchie National Forest, near Alexandria, La., in the winter and early in the spring of 1935, *Atta texana* defoliated young longleaf pine in new plantations, in various locations in sandy areas, over a total area of about 60 to 100 acres. The defoliated trees put out new needles and some survived, but many, even after the new needles came out, succumbed in the hot, dry July weather, as was indicated by a general examination made on July 31. Some of these deaths must be attributed to drought and poor sites. A general survey showed that tree mortality and site were markedly and clearly interrelated, for on the slopes covered with rank grass and weeds the pine plants as a rule were healthy, whereas in sandy washes and on hill crests there was a higher mortality.

A strip survey involving all sites, and including an area severely defoliated by ants, was made in May 1935 and again in August of the same year. The longleaf pine had been planted in 1934-35. The mortality in May was 16 per cent and on August 2 was 36 per cent, but factors other than ant defoliation were responsible for part of this.

The poorest site was on the sandy bottom and the better sites were on the slope and at the top. Some of the defoliation was not the work of ants but appeared to have been caused by disease or mechanical injury. A few trees had been dragged down into gopher holes.

In defoliating the young longleaf pine plants some of the larger workers climb up the pine and cut off large sections of needles. A smaller worker on the ground cuts the fallen sections into smaller sections and any of the workers may carry these to the nest. The soldiers usually do not carry leaves to the nest, their work generally being restricted to that of guard duty.

On March 2, 1936, a re-examination was made of the injury on the Evangeline Planting Unit. Since the spring of 1935 damage the young planted longleaf and slash pines by leaf-cutting ants has been serious. The damage to longleaf

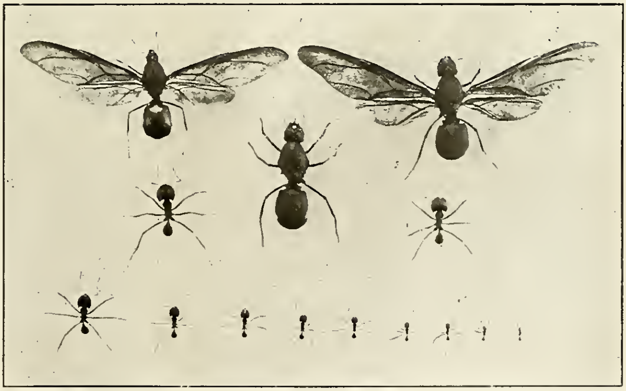

Figure 1. a. A life history group of the leaf-cutting ant, ATTA TEXANA Buckley, showing the various castes and sizes as found in a single nest: winged male and female, soldier, and workers. The wingless queen was collected during the winter in a different nest. Photo. by E. V. Walter. (Natural size)

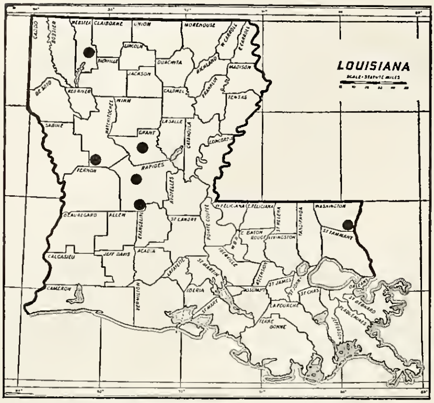

Fig. 2. Areas in Louisiana where the leaf-cutting ant (ATTA TEXANA Buckley) has caused injury.

pine consists of defoliation varying from slight to complete, whereas in the case of slash pine not only are the trees defoliated but in addition the bark is eaten off the stem. Defoliated trees may recover but girdled trees always die (fig. 3).

The damage by *Atta texana* occurs within a radius of from 150 to 200 feet from the principal nest. The nests have many secondary entrance holes, and some of the larger colonies cover a considerable area of ground. As has been shown, the damage occurs during the season when no green oak leaves are available, and unfortunately this coincides with the planting season. Activity of the ants is based mainly on temperature; at 40 degrees to 45 degrees F. they are inactive but as the temperature rises they become increasingly active up to approximately 80 degrees to 90 degrees F. They are not active on cold, wet, or cloudy days—at least not in the morning—but remain in their nests. No very broad, definite trails, such as those of similar ants in the tropics, are made by this ant, but in the areas under observations narrow, definite trails often extend from the nest to the food plants.

Control in Plantations

Over an area of 4,000 acres a total of 493 nests have been treated. Up to the end of April 1936, which is the last date for which costs have been figured, several methods of control were put into effect. Of those nests treated with carbon disulphide only a very few have shown subsequent ant activity and these are being retreated. There is evidence that these treatments will give permanent control, as nest colonies treated in the spring of 1935 were inactive the following year.

The cost of treating these 493 colonies (averaging 20 holes per colony) on the 4,000-acre area was at the rate of 16 cents per hole. One gallon of carbon disulphide (at 9 cents per pound) was used for every 6 main holes and the lesser outlying holes were treated with gasoline. In a colony of average size about 2 gallons of gasoline and 1 gallon (10 pounds) of carbon disulphide were used. The disulphide and gasoline were, of course, used separately and the holes were closed immediately after the liquids were poured in, so that the fumes would remain in the ground. Although twice as much gasoline as carbon disulphide was used per colony, the gasoline was not so effective as the carbon disulphide nor were the results so permanent.

Areas where nests were treated with carbon disulphide in January 1936, before planting, are now free from ant injury to young pines. This is very encouraging, and it is believed that by continuing the easily applied carbon disulphide treatments—which are relatively inexpensive, especially before planting—the ants can be controlled, or may even be exterminated if the nests are treated in the morning on cold, wet, or cloudy days when the activity of the ants is at a minimum and when most of them are in the nests.

Careful records of these treatments are being kept, the areas being plotted on a map and staked in the field so that re-examinations and checkings can be made at any time.

Experiments in which seedlings were dipped in poisons—bordeaux mixture and lead arsenate—were unsuccessful. The ants continued to cut the poisoned needles until the plants wilted and many of them died. Possibly too strong a solution was used. Dusting with calcium cyanide, which was tried in one series of experiments, was not successful. This dust apparently was effective only when it came into direct contact with the ants. Because of the danger attendant on its use with CCC labor and because of the length of time required, treatments with calcium cyanide were not repeated. London purple barriers can be used only in dry weather, since rain renders them ineffective. Experiments will be conducted with this chemical during the summer.

At present the outlook for permanent control of this ant in plantations is encouraging, especially where nests can be treated before pine seedlings are planted.

Damage to Natural Reproduction and Habits of the Ant in the Forest

Another type of injury was reported in 1936, namely, damage to young natural reproduction. An examination was made on March 2 on the Dry Prong Area of the Palustris Experimental

Forest, where there is excellent natural reproduction of longleaf pine from the bumper seed crop of 1935. On this experimental forest there are approximately 35 to 40 nests, mostly small, and about 10 to 12 large nests of *Atta texana* and near the nests the loss of young pines due to the leaf-cutting ants is 100 per cent. No great difference in ant damage was observed in areas burned at any time as compared with unburned areas. On areas where there were no oaks there was some evidence that the damage was greater than where oaks were present.

Where there are no pine seedlings left, the ants are cutting up dead pine needles, dead oak leaves, green grass, and weeds. Near small longleaf pine trees, the ants are climbing the trees and cutting green needles.

CONTROL IN THE FOREST

On the Dry Prong Area the damage for this year has already been accomplished, but control work with carbon disulphide and London purple was begun the summer of 1936. The method to be used in applying London purple is that recommended by Wildermuth and Davis[3] for the red harvester ant (*Pogonomyrmex barbatus* F. Smith) and is as follows: Late in the spring, or during the summer, one-half ounce is applied in a circular band around the entrance hole to the nest. This band should be not wider than 1½ inches and the circle should be about 4 inches in diameter. The inside edge of the ring should be not more than 2 inches from the entrance hole. This application should be repeated at least three times at intervals of 10 to 12 days, and should always be repeated after a rain.

By treating these nests in this area as described, this infestation should be controlled, thus giving the seed crop an opportunity to reseed the area denuded of seedlings by the ants early in the spring of 1936. Early results up to July 15 with both carbon disulphide and London purple promise an effective control.

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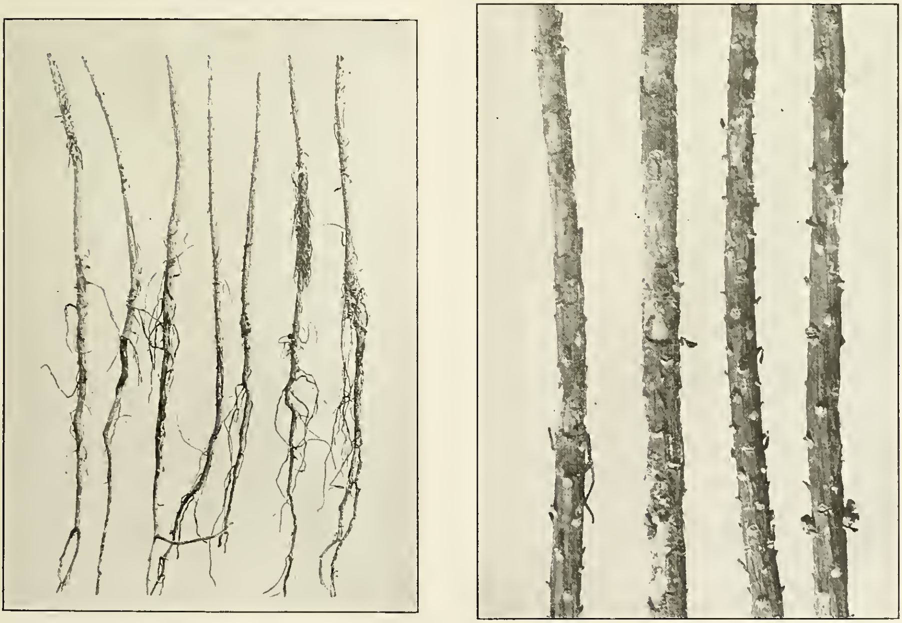
[3] 1931. Wildemuth, V. L., and Davis, E. G. The red harvester ant and how to subdue it. U. S. Dept. Agr. Farmers' Bull. 1668, 22 pp.



Natural Size

Enlarged

Figure 3. Injury to young slash pine in plantation on the Kisatchie National Forest near Alexandria, La., by a leaf-cutting ant, ATTA TEXANA Buckley.

No Maps in a Mapping Age

Conservation and Utilization of Vast Potential Wealth Is Accordingly Crippled

By **WILLIAM BOWIE**
Member American Society of Civil Engineers
Chief, Division of Geodesy, Coast and Geodetic Survey, Washington, D. C.

Among informed Americans there is ample familiarity with our national delinquency with regard to mapping and surveying. This has also been recognized by the Society in repeatedly advising government officials and lending the weight of its influence toward rectifying the present glaring deficiencies. Dr. Bowie has consistently emphasized these deplorable conditions, but in the present article he approaches the problem rather from an economic angle. Rich as we are beyond all nations, he reminds us, even so we cannot afford to squander our resources at the present rate. He instances water supply, mineral and agricultural resources, and road planning to show that enlarged mapping is an indispensable prerequisite for national development. The time is ripe, he emphasizes, for America to show as much purposeful interest in rational conservation as it has exhibited energy during the past in omnivorous consumption of its natural wealth. His arguments are forceful and his suggestions for an expanded mapping program must commend themselves as logical and practicable.

This valuable discussion is reprinted from Civil Engineering.

Today, every one is map conscious. It makes no difference whether he is traveling by automobile from one town to another, engaging in flood prevention work on rivers, laying out routes for highways, or working on prevention of soil erosion, utilization of land, and development of forests. Whatever his interest may be, he wants a map. In many cases the only map that he can get is a rather crude affair. In general, it is not accurate in position, distance, direction, or elevation, nor does it show the slope of the terrain.

To be useful a map should be a graphic representation of a part of the earth's surface. It should have a high degree of accuracy in the plotting of its details and show all the natural and artificial features that can be used in planning and in the execution of plans.

This country is very poorly mapped. In fact, it is one of the most backward in this particular of all the highly organized countries of the world. Why should this be so? There are probably many explanations, but the principal one is that we have been rich enough to survive the handicap of inadequate mapping. Our people have been blessed with a great wealth of natural resources and vast tracts of land; speed has been our god. When we plan a project, we want the dirt to fly today, or at the latest next week. Suppose promoters are told that a better job can be done if a map is made first; they are disgusted to learn it may be a month or more before an accurate topographic map can be produced, one that will show every feature of the area to be developed.

Riches Beyond Measure

We should realize that the present generation has inherited this country from its ancestors. As wise inheritors we should make an inventory of this wonderful patrimony. What has been handed down to us consists of three million square miles of land with soil of various degrees of fertility, an untold wealth of forests, rivers, streams and underground waters, and mineral resources of all kinds including oil, gas, and coal. These are the essentials for maintaining human life and for providing means of producing and distributing needed goods.

We have little knowledge of the potential wealth of America. We do not know the quality of the soil except for a part of our area. We do not know exactly what we have in our public and private forests. As for oil and coal, we have had all kinds of estimates for the last fifty or more years, first telling us that the supplies were limitless and then stating that in a very few years these supplies would be exhausted at the current rate of consumption. These are merely guesses—no one knows. No complete survey of the natural resources of this country has ever been made. There is no more urgent problem before the American people today than to find out just what we have, where it is, and whether it can be utilized. Then plans can be made for the use of our inheritance.

These plans should be rational rather than wasteful. They should not be designed to follow our long-standing practice of tearing out of the ground in a few years every thing that is there. We must, of course, use those parts of our resources that are necessary to our existence, but we should strive to hand down to the next generation our inheritance as little impaired as possible.

Water Also Can Be Squandered

So far as we know, there is only one natural resource that is inexhaustible, and that is earth—rock, sand, and gravel. The amounts of these, of course, are fixed, but they exist in such vast quantities that we can count upon their supplying the needs of man for building structures of various kinds, including highways, for an indefinite future.

It may be claimed that the waters of our rivers are also inexhaustible. I gravely question this. While we do have rivers that have been flowing at a more or less constant rate since the first colonist came to this country, yet these rivers are being impaired. The marshes at their heads that supply a continuous flow of water are being drained. Natural grass and forests are being removed from drainage areas. This means that the water falling as rain rushes down the slopes, carrying vast quantities of soil and debris that fill up the river beds, causing disastrous floods. Who knows but that eventually, with practically all the land denuded of natural vegetation, the rivers will be merely channels, gorged at times with storm waters but practically dry between storms.

If the waters of our rivers and streams could be conserved by saving the swamps and marshes that head them and by retaining the vegetative cover in order that rain water may drain to the rivers gradually, they would remain a constant source of power. But without planning for the use of water, without conserving and protecting rivers and streams, we may expect in a comparatively short time to see this potential wealth definitely depleted.

For generations soil in this country was assumed to be inexhaustible. But assuredly it is not. We have been most wasteful of our agricultural land. We have let quantities of it wash away and we have depleted the fertility of other parts by stupid agricultural procedure.

One very clear case of the wasteful use of land comes to my mind. Some years ago I was working at a triangulation station in Minnesota in the Red River Valley, at one time one of the most fertile parts of our country. A farmer in an adjoining field was plowing in wheat stubble. I asked him what he intended planting in that field. He replied that he would put it back in wheat. Upon inquiry, I learned that he had already had that field in wheat for five consecutive years. I remarked that he was destroying the fertility of his soil and that shortly he would not be able to raise a crop that would repay him for his labor. He replied that he did not care, that he was a renter, and that when he could not make a living on that farm he would move to another one.

In that same wonderful wheat region, or what used to be a wonderful wheat region, I have seen great piles of stable manure allowed to dry. Then in mid-summer matches would be put to them in order to get them out of the way. Similarly wheat stacks were burned. I asked the farmers why they did not utilize the great value of this manure and they replied that the land was rich enough to raise a crop without having to go to that trouble. This land in the Red River Valley of Minnesota and the Dakotas when first cultivated would produce from 30 to 50 bushels of wheat per acre. I do not know just what the average yield is now, but I believe it is between 12 and 18 bushels. It just barely justifies a farmer's labor in planting and harvesting the wheat. If this same land had been cultivated in a rational way, with a rotation of crops, there is no reason why it could not have retained its original fertility. There are fields in Europe that have been cultivated from the days of Caesar and yet they are perhaps more fertile now than two thousand years ago.

MAPS FIT INTO THE PICTURE

But what has all this to do with mapping, some one will ask. In most cases there are no maps showing the slopes of ground and the locations of the areas where soil erosion is going on. Suppose a farmer tries to protect his land from soil erosion and the farmer higher up the valley is not conserving his soil. It is possible that there will be a flood of waters coming from the upper farm, and the efforts of the farmer lower down the valley will be nullified by the carelessness of his neighbor.

That soil erosion must be attacked in a national way as well as by individual farm owners is fully recognized by the Department of Agriculture, which has been conducting soil erosion studies on a large scale in many of the states. In making those studies the first things called for are maps, and suitable maps being notoriously lacking, they have to be made, and made in a hurry. And, of course, these maps are suited only to the problems in hand. Could the money spent in providing maps for the soil erosion studies in these states be applied to the national mapping program, great economy would result. Why not anticipate future studies by having the maps ready before the studies are undertaken?

To mention another field—there is a constant struggle to keep our forests from deterioration. Ever-present forest fires, most of them due to carelessness, destroy probably as much timber per year as would be produced as the result of replanting.

Problems of the forests, soil, rivers, and streams can be solved only by having a knowledge of the terrain, and this knowledge can be obtained only from accurate maps.

HIGHWAYS, TOO, REQUIRE MAPS

During the past few decades, we have spent untold millions on the extension of our highways, but in many cases the locating and building of the highways have been done without adequate knowledge of the areas covered; and in consequence there have resulted many poor locations and poor designs for highway structures. An engineer from the South told me recently that in his state, which has only part of its area mapped, the annual cost to the State Highway Department of replacing washed-out bridges, culverts, and sections of highways is enormous. He blames most of the destruction on the lack of knowledge of the terrain. A good map will give for every river, stream, and gulch the exact area that drains into the watercourse. Without knowing whether this area is large or small, the highway engineer is likely to make mistakes in deciding on the waterway to be allowed for bridges and the dimensions of his culverts.

This engineer expressed the opinion that a complete topographic map of his state would save almost as much money to the highway department annually as the mapping would cost. Does it not look as if we are bungling to continue to work without maps?

SORT OF A GEOGRAPHICAL CENSUS

Every ten years we take a census of our country to obtain knowledge of its population and industries and to collect other information, which is out of date by the time the reports of the census have been prepared and printed. Yet these census reports are valuable and justify their cost. They undoubtedly help our people in industry, commerce, and transportation. But would it not be well to consider also that the map gives us a census of what is on the land and that the map once made and made accurately is of permanent value?

All we need to do to keep it strictly up to date is to have an airplane fly over the mapped area once in five or ten years and take photographs of the country. From these photographs, the map-maker can see at a glance what new features have come into existence since the map was made. These can be put on the new edition of the map. Then again, the pictures will show that certain features, such as houses or forests, have been destroyed, and should be omitted.

The mere question of the use of our metals should be a matter of concern. The amount of high-grade iron ore that we have is not inexhaustible. We pride ourselves upon developing so much steel per year, and the chances are that a large part of it rusts out. Junk piles are seen almost everywhere. Why not conserve our metal? There is a sentiment now, which is rather widespread, in favor of using non-corrosive alloys. Of course one will say that it costs more to use non-corrosive alloys or scrap iron than new ore. That may be true, but some day the human race will find its supply of iron ore pretty low. Far better to put our efforts, thoughts, and energies to using our resources in a rational way rather than to exhaust them by using great quantities at less expense per unit mass of material to save a few dollars.

In the matter of fuels, it is claimed that in many cases it is cheaper to use oil, gas, and coal than water power. This may be true today. But some day we may find the quantity of fuels running low and then we will have to make full use of water power. Why not let the use of water power be coincident with the rational use of natural fuels? Then, again, let us conserve our rivers by maintaining the sources of their waters; otherwise they may deteriorate so that they cannot be used for power.

No matter what we say about our natural resources, their extent, or their uses, we are brought squarely up against the question of whether we have an adequate knowledge of our area. The answer of course must be "No."

(Continued on Page 29)

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THE HUNDRED DAYS' FLOWER

A Brief History of the Crepe Myrtle

By **CATHERINE B. DILLON**
New Orleans, La.

Summer is crepe myrtle time in the southland. Through the highways and byways of the picturesque lower coast, it flashes its glory, breathing romance as it rustles on the warm gulf breeze. Of all Dame Nature's trees, is another half so fair? The intriguing beauty of this radiant shrub, that stands in colorful array along the grass strips of the *banquettes* and *neutral grounds* of old New Orleans and the *sidewalks* and *esplanades* of other southern cities, carries one on a mental journey through charming, faraway places.

The crepe myrtle, also called the Indian Lilac, is of South and East Asiatic origin—remotely a native of China, but also considered to be indigenous to Northern Australia, the East Indies and Africa. This deciduous, ornamental tree, with its plume-like clusters of showy blossoms, is identified botanically as the *Lagerströmia* or *Lagerstroemia Indica*. Scientifically, the genus is related to many plants, but it belongs immediately to the *Lythrarieae*—the Lythrum tribe or Loose-strife family—a group of herbaceous shrubs bearing bright purple and crimson polypetalous flowers. Although, individual traits establish the crepe myrtle as a separate genus, its beautiful flower panicles link it with the lilac of the genus *Syringa*, while in its leaves and seed, it is related to the *Myrtaceae* or Myrtus tribe.

The plant was named *Lagerströmia* or *Lagerstroemia* by Carl von Linné (1707-1778), known to the world of science as Linneaus, who published the genus as a tribute to honor his friend, Magnus von Lagerström (1696-1759), a director of the Swedish East India Company. Through the vessels of this Company of the Indies, which was formed at Gothenburg, Sweden, in 1741, Linneaus was able to obtain many interesting botanical specimens from Asiatic countries. This distinguished Swedish naturalist, whose own name came from the linden tree, was the founder of the Linnean System of Botany in which the scientific plant names were established. Although, his father was a minister and his mother a clergyman's daughter, he showed no tendency towards a religious vocation, but at an early age his interests were botanically inclined. Apprenticed to a cobbler by disinterested parents, the boy wrestled with the problem of making shoes, studying for his chosen career in between times, until rescued from a shoemaker's fate by a prominent physician of his hometown. Linneaus became professor of medicine and of botany at Upsala University. In 1753, he published his famous *Species Plantarum*. (Blame *him* for the tongue twisters!)

About five of the numerous species of the genus *Lagerstroemia* are commonly cultivated. The shrub is herbaceous and coriaceous—ten letter words for "woody" and "tough". The tree ages prematurely. When it is still young, unless braced and trained to stand erectly, it assumes the posture of an old, decrepit person, with its limbs bending into weird turns and twists, in the manner of shrubs grown in volcanic areas. The parchment-like bark that peels, leaving white splotches on the trunk and limbs, adds a ghostly touch at night. The smooth, green, oblong leaves are arranged opposite on the stem—rarely ever alternating. They resemble the myrtle foliage, but the true myrtle is an evergreen, while the crepe myrtle, although its leaves are persistent and do not fall until late in winter, is deciduous. During summer, the foliage is bright green, but, in autumn and early winter, it becomes very attractive, varying from yellow to deep, rich scarlet.

Crepe myrtle flowers abundantly in sub-tropical climates. Its paniculate, axillary inflorescence begins in spring as a small bunch of green "berries". These turn pinkish before opening to unfold the beauty within. The tree blossoms in June in the Gulf States. Despite the mid-summer heat, the bloom lasts about three months, from spring to fall. Borne in great profusion, the terminal crepe myrtle racemes or panicles—compound clusters of fringed blossoms—growing upright from an axil at the branch ends, are exceedingly beautiful. The single corolla, with its crisp, wavy petals proceeding from a narrow claw-like stalk, is classified as *unguiculate*. Some varieties have short, scanty panicles, while others produce long, heavily branched clusters.

Besides white, colors vary from lavender tinged white to dark heliotrope, and from the faintest pink through the darkest crimson, with

Crepe Myrtle—Lavender Variety.
From Plate No. 405, Curtis' Botanical Magazine, 1798.

practically every intervening tint and shade. One variety looks as though a tiny drop of violet has been added to white, and a flesh type, apart from white, might be mistaken for it. The commonest colors are, white, pale pink, bright pink, solferino, rose, magenta, lavender and heliotrope. The deep crimson or watermelon color, the dark lavender and the white are the most beautiful, especially in the long, heavy clustered varieties.

The panicle merges from berries to berries, for the blossom forms a berry or ovary. Designated as belonging to the cohort *myrtales*, this fruit, which has an indefinite number of cells or ovules, is indehiscent. It does not open spontaneously, but depends upon decay and outside influences to set its seeds free. The berry, when ripe, is black, and in the midst of the colorful autumn foliage, it adds considerably to the shrub's decorative qualities.

Lagerstroemia Indica has been naturalized in all warm sections of the globe. It was introduced into the United States in 1759—the year of Magnus von Lagerström's death. Not hardy in cold climates, it cannot be grown north of Long Island, but it has been known to endure as low as ten degrees below zero, thriving well as far north as Baltimore and Washington, D. C. Throughout the lower southern states, from Florida through Texas, crepe myrtle flourishes luxuriantly.

The shrub may be developed from seed, but root shoots and cuttings are more practicable. In cold climates, young plants thrive best under glass. This means of protection is employed considerably in the Old World. Although the crepe myrtle's life is a long one, it achieves its greatest span of growth during its first twenty-five years. In the Plains of Texas, the tree is medium sized, from four to six feet, but farther south it attains a height from ten to twenty-five feet. In the more northerly sections, the shrub takes on a frail, delicate appearance.

As the crepe myrtle loves the sun, planted apart from other trees, it grows beautifully, but, it will thrive well, even amidst dense shrubbery, making a successful fight for a prominent place in the shade. Heat and dry weather are withstood, but moisture improves the plant's growth. The panicles are borne on the new wood, so pruning is not absolutely necessary, but it will add considerably to the shrub's beauty. A tree pruned after one season shows marked improvement the next blooming period. While in flower, cutting the panicles constantly, increases the beauty of the subsequent blossoms and produces a more luxuriant bloom. When flowers are allowed to wilt on the tree, the new clusters are less lovely.

In some sections, neglect causes a poor crepe myrtle crop, as the length of the flowering season depends upon care and moisture. Color also is often influenced by soil conditions. A shrub that bore very scanty, pinkish-white blossoms while grown on the sandy shores of the Mississippi Sound, when transplanted to Texas, produced a bright pink, fuller bloom. Sometimes the earth needs to be cultivated around the roots. If broken and a fertilizer is added, the crepe myrtle will take a new lease on life. Severe weather kills the tree back to earth, but, usually, new shoots will spring from the roots. Insects and scale cause fatal damage, if not corrected in time. Especially prepared sprays may be obtained for eliminating these evils.

In the gardens of China, the crepe myrtle's ancient birthplace, where the shrub is greatly admired, it is cut and trained into fan-shaped trees. In Oriental lore, the folding fan, radiating from its rivet, is an emblem of life. Pruned in this manner, the crepe myrtle, widening and expanding as the fan does in unfolding its loveliness, depicts life bursting into bloom. The native Chinese name for the lavender variety is "Tzu Wei", meaning "tree with purple flower", while the pink-toned crepe myrtle, merging from delicate peachblow to deep crimson, is known as "Pai Jih Hung". "Pai Jih" means "one hundred days", "Hung" means "red". It is so-called because it blooms through summer to autumn, about one hundred days. In Japan, during the warm season, the crepe myrtle is the nation's most popular flower, ranking above all others in beauty. The Japanese name "Hyaku-jikko" means, literally, "the coming out continuously for a hundred days". This shrub grows well in Europe along the Mediterranean. In Spain and Italy, it is called "mirto"; to France, it is "myrte".

In Bermuda, where it was first brought from Caracas, crepe myrtle is the "Queen of Shrubs". Growing only in private gardens of very old homes, it is not common on the islands, but Bermudians point with pride to a few trees reputed to be over two centuries old. Because it was brought from India, where it has always been cultivated extensively, in some British countries, this plant is called the Indian Lilac, but, it is also known as the "ladies'-streamer", a corruption of *Lagerstroemia*. The name "crepe myrtle" is commonly employed, but as the word *crape* conveys an image of an old-fashioned symbol of death on a door-knob, the form "crepe myrtle", used in Louisiana, is more pleasing, for the French term creates a picture of a lovely, sheer, crinkled, silken something—very much akin to the beauty of this shrub.

In Washington, D. C., unless killed by zero weather, crepe myrtle, with proper care, will survive the winter. Despite the low temperature felt in the Capital, many comparatively old trees endure the ravages of frost, ice and snow, and most of those unable to withstand severe cold, usually spring up from the roots in time to bloom in summer. For several years prior to and after 1918, a pink specimen stood near the Pennsylvania Avenue entrance to the Botanic Gardens. This shrub was transplanted to the New Botanic Gardens site at the southwest corner of the Capitol grounds. Pruning at the time of its removal, and annually since, has developed a luxuriant bloom and a sturdier tree—now about eight feet tall. Other crepe myrtles in the Botanic Gardens thrive similarly.

For a long time after its introduction into the United States, the crepe myrtle's cultivation was restricted to private estates. In 1851, in old New Orleans, one finds it listed among the rare decorative plants advertised by John Greenfield's Seed Store, Exchange Place and Customhouse (now Iberville), to be seen at his nursery "at Poland street near the Tobacco Warehouse". Many of Greenfield's shrubs found their way into the old Garden District of New Orleans, where, today, some may still be seen. On the attractive grounds of one Prytania street residence, close to the house, a beautiful, tall, slender, white crepe myrtle bends with the weight of its heavy panicles—a glory of snowy clusters, swaying like plumes on knightly heads in pageants of long ago, and, across the green velvet lawn, against the mellowed brick garden wall, a prim, upright, bright pink variety, crisp as a maiden dressed for a dance, spreads its summer finery.

During *Lagerstroemia's* blooming season, Jackson Square, as mottled as an artist's palette, lends a kaleidoscopic touch to the Vieux Carre. Among the many flowering shrubs, "Pai Jih Hung" flaunts its rosy brilliance, while at the doors of the old Saint Louis Cathedral, from over the wrought iron fence along Rue Chartres, one is greeted by the lavender loveliness of "Tzu Wei". In the newer faubourgs of New Orleans, rows of crepe myrtle sentinels flank the grass strips, often merging in the same block from white to crimson and through the lavender tones. About twenty years ago, in the Mid-City section, small trees were planted along South Solomon street. Today, in a glance up this street, a breath-taking eyeful of color is viewed.

The crepe myrtle's purpose is purely ornamental, but in this its duty is beautifully and successfully performed. Its crinkled bunches of lovely flowers make it a most effective garden decoration. Suitable for specimen planting, groups, masses, rows or single trees, it may be

(Continued on Page 25)

BAYOU PHANTASY

Staid old live oaks
Trailing Spanish moss on the banks of a bayou
Are sturdy old Cajuns
Who have let their long grey beards grow.

—KATHERINE KELLY WOODLEY,
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MISCELLANEOUS GEOPHYSICAL METHODS

(Continued from Page 4)

rise toward the crest of anticlines. Fault zones sometimes can be detected by geothermal prospecting.

A magnetic needle suspended at any observation point on the earth's surface will take a certain definite position due to the earth's magnetic field. Magnetic charts indicating the direction and magnitude of the earth's magnetic field at a particular spot are also available. However, if a more sensitive magnetic instrument is placed at any particular point on the earth's surface, the observed magnetic value will not correspond exactly with the value taken from the chart. This difference, a so-called magnetic anomaly, is due to the presence of magnetic material in the formations situated near the point of observation. The magnitude of the local anomaly depends on the character of the material in the formations, its dimensions and its distance from the observation station.

The amount of magnetic material that is disseminated through igneous and sedimentary rocks varies greatly as is shown below:

Limestone	is	10	times as magnetic as rock salt
Sandstone	is	40	” ” ” ” ” ”
Basalt	is	600	” ” ” ” ” ”
Granite	is	1000	” ” ” ” ” ”

Maps of magnetic surveys are usually expressed in isonomalic lines (isogams), that is, the lines which connect the points of equal magnetic vertical or horizontal local anomalies. Magnetic profiles are also usually made. Magnetic prospecting is cheap, and, in some localities, a dependable tool of geophysical prospecting.

All material bodies are attracted to each other. This force of attraction is proportional to their masses and inversely proportional to the square of the distance which separates them. The magnitude of the gravity force due to the earth's attraction is known at many points and can be computed from the charts for any point on the surface of the earth. The presence of unusually heavy or light material or formations or structures near the observation station will give observed gravity values that do not agree with the theoretical values calculated from the charts. These variations are known as anomalies.

One of the most popular instruments used to locate the presence of heavy or light masses underground is the Eötvös torsion balance. Torsion balance maps express local anomalies in "gravity gradients" and in "curvature" values. Gravity gradients point toward a heavy mass and away from a light one. On the very top of a heavy or light mass it is equal to zero. The magnitude and distribution of the gradients depend upon depth, form, and material of which the anomaly is composed. Sometimes when "curvature" values are plotted on a map they give a clear picture of the shape of the local anomaly because their directions are often parallel to the strikes of the underground structures. Both "gravity gradients" and "curvatures" are expressed in Eötvös units. One Eötvös unit is equal to one billionth of a dyne.

Torsion balance prospecting is more expensive than magnetic prospecting but cheaper than seismic prospecting. It is a dependable geophysical tool in some localities. It is also useful in checking structures located by magnetometer.

Pendulum and gravity meters as used today to measure the total attractive force of gravity at the point of observation. Hence, by subtracting the value of normal gravity as taken from charts the magnitude of the local anomaly can be determined.

Recently gravity meters are beginning to be recognized as reliable and effective tools for oil exploration. Some of the major oil companies are using gravity meters developed in their own laboratories. Other companies are using instruments made and developed in foreign countries. Still other companies are using the Mott-Smith or Blackburn gravity meters developed in the United States.

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IS THE PAPER INDUSTRY MOVING SOUTH

(Continued from Page 9)

sively, will guarantee the pulpwood needed at a price of from $4 to $6 a cord. That may be true but a Board of Directors would not risk the company's money unless the undertaking could be justified on the basis of the competitive price of pulpwood in the open market. I am talking about a paper mill investment, not a speculative adventure in timber growing.

In conclusion, the South is now doing a good business in the manufacture of kraft paper. Indications are that further developments along this line will take place before attempts are made to make other grades of paper. There are abundant supplies of both pine and hardwood to support additional mills but not unlimited supplies; locations will have to be chosen with some degree of care. The present stand of timber is very thinly distributed but with successful fire protection and especially with intensive management, it is theoretically possible to grow large volumes of wood.

It is my belief that it will be a long time before anything like full stands are obtained over large areas. The average site is difficult to estimate but I believe the South can and will grow timber twice as fast as it can be grown in the North.

It seems probable, although not certain, that commercial methods will be found to make so-called "white" paper from Southern pine. By "white" paper is meant newsprint, and the higher grades now made from spruce by the sulphite process. The road to success will probably be found somewhat stony and progress may be slow, but eventually some degree of success seems likely. The production and sale of the higher grades of pulp, rather than paper, would be the most logical development at first since America now imports a large tonnage of bleached and unbleached pulp used by the numerous "converters." Apparently, Southern pine pulp, which could be substituted for the imported article at a cheaper price would find a ready sale; but the higher grades of paper, made from Southern pine, would find a market already supplied by mills well entrenched with excellent sales organizations and with perhaps surprising ability to meet competition on the basis of both price and quality. No one can really prophecy what might be the outcome of such regional competition. Probably some kind of a balance would be struck after the more favorable locations in the South have been occupied and after some of the weaker mills in the North have dropped out.

I suspect that spruce will remain the "King of the Pulpwoods" even though part of his domain and perhaps a little of his glory may be taken away. Certain inherent qualities found in spruce which have made it supreme in the part will, in all likelihood, prove it superior in the future. The highest grades of paper will still be made from spruce, and the products of Southern pine, while marketable, will not reach the upper price brackets.

THE HUNDRED DAYS' FLOWER

(Continued from Page 23)

pruned to a low bush formation for hedging or trimmed to grow as a tall, slender tree. Sentimentally, the crepe myrtle means much. The myrtle, sacredly consecrated to Venus, ancient goddess of love, stands for "love and emotion", but it was also employed as a symbol of civil authority and served as a decoration in contests not involving bloodshed. The purple lilac symbolizes "budding love — love's first emotion". Alone, *Lagerstroemia,* in its own meaning, "eloquence", involves all of these sentiments, for the radiance of this queenly shrub, that tints the landscape of Dixie with its bloom for a hundred days, is as inspiring as the most glorious civil triumph and as soul-stirring as young love's most momentous thrill!

BIBLIOGRAPHY

Bailey, L. H., Cyclopedia of American Horticulture.
Ingram, J. H., Language of Flowers.
Parker, M. M., (B. S.) "Ornamental Plants for the Home Grounds", (Bulletin 62, Virginia Truck Experiment Station).
Small, John K., Manual of the Southeastern Flora.
Trees and Shrubs of Northwest Texas (Bulletin 447, Division of Horticulture, Texas Agricultural Experiment Station).
Waterman, Catherine H., Flora's Lexicon, An Interpretation of the Language and Sentiment of Flowers.
Wilson, Ernest H., China, Mother of Gardens.

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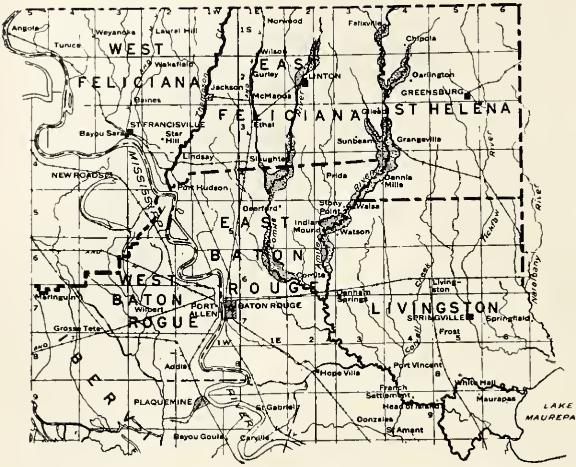

Map showing the location of Beaver colonies along the Comite and Amite Rivers in the parishes of East Feliciana, St. Helena, East Baton Rouge and Livingston.

THE BEAVER, FOREMOST WILDLIFE CITIZEN

(Continued from Page 13)

Irrigation District. The District went broke and the bond holders lost over $1,000,000. Instead of enough water to flood 18,000 acres, only 8,500 are now watered.

Throughout the western part of our country the mania for building big dams jumps the popular mind from millions to billions of dollars. Are we not losing our breath in the race? Have we forgotten that it takes hundred and thousands of small water supplies to create big reservoirs? Have we forgotten that a great dam costing $200,000,000 will silt up in fifty or a hundred years and be useless unless soil erosion is checked at the headwaters? Have we forgotten nature's use of land and water and her simple methods of creating wealth with no expenditure of money?

Here is where the beaver comes in. Now, we must admit that he doesn't fit into an irrigated farming community because he cannot look at a ditch without wanting to dam it. He is like a cow that gets into a garden. He shouldn't be killed, but put back where he belongs. In the past when any complaint was made of beavers doing damage, an ignorant legislature always opened the season. The trappers did the rest.

Fortunately at the present time a plan has been worked out by the State Game Commissions, the federal Forest Service and the Biological Survey whereby special live-traps are used to capture these animals where they are not wanted. They are transported alive back to the headwaters of streams in the dryer forested areas. The increase of small storage reservoirs through eastern Oregon is gradually building up a wealth that was once destroyed. All this is the wealth bestowed by nature, and is not burdened with a mortgage.

Old Man Beaver will always be a gentle, unheralded worker for his own sake. Sometimes he turns the laugh on his friends. Up in the Wallowa Valley a family of beavers built a dam below a little mill. The owners insisted that the beavers were a nuisance and asked for their removal. The game warden, having no live-traps, served notice on the beavers to move down stream. With a shovel and axe he tore out half the dam. Since the habit of the beaver is to work only in the dark, he stuck his shovel and axe in the mud, and on the top he hung a bright lantern.

Returning in the morning, the warden was surprised to find that someone had stolen his tools. The dam was carefully re-built. The shovel, axe and lantern were buried in the mud and sticks, used by the beavers to reconstruct their dam.

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Louisiana Geological Survey,
Department of Conservation

THE DEPARTMENT PUBLISHES A DETAILED GEOLOGIC REPORT ON THE LOWER MISSISSIPPI RIVER DELTA; PLAQUEMINES AND ST. BERNARD PARISHES

Geological Bulletin No. 8 has been released by the Department of Conservation and is now available for distribution. Under the title "Lower Mississippi River Delta," this volume, which will be over 400 pages in length, consists of several individual reports, each dealing with some phase of the geology and geography of Plaquemines and St. Bernard Parishes.

In the Lower Delta, geological processes today in active operation are duplicating before our eyes the course of earth history of past times. The Mississippi River has dominated the sedimentation which has yielded a rock column extending down below the surface of Southern Louisiana to a depth of more than twice that of the Gulf of Mexico. Sands and muds carried down by the river and deposited along shores and in marshes were similar to those of the Gulf Coast today. During the passage of time these have solidified so as to become rock. Rising cores of salt, here and there, have pushed up against and through portions of this rock section and have allowed petroleum to accumulate in commercial quantities around their borders. At the tops of these salt cores various minerals have gathered, including sulphur in quantities unequalled in other parts of the earth.

A large portion of Bulletin No. 8 is devoted to the description of geological changes now taking place in the Lower Delta. This is included in the initial paper of the series, "Physiography of Plaquemines and St. Bernard parishes," by Dr. Richard Joel Russell. The subsurface geology of salt and sulphur domes is treated in detail by Dr. H. V. Howe and Mr. James H. McGuirt. The description of an interesting group of fossil animals characteristic of deep water today, but found associated with salt domes in the Lower Delta, is included in this section of the report as are detailed maps and cross sections of all major structures. Two papers by Mr. Christian F. Dohm are concerned with sedimentation and rocks. One is a detailed analysis of the sizes of materials found in the recent muds, sands, and clays as well as the clays of the mudlumps found toward the mouths of the river. The second paper is a description of an interesting group of igneous rocks found on the outer beach of the Chandeleur Islands. A short paper by Mr. Wade Hadley contrasts the living beach animals of the eastern side of the river with those to the west. Dr. Fred B. Kniffen has contributed a paper on the pottery found in association with old Indian village sites, camps, and mounds. Several different Indian cultures are identified and samples of pottery are illustrated. Dr. Clair A. Brown has included a short paper concerning the living vegetation of the Indian Mounds. The Bulletin also contains a bibliography of over 400 books, articles, and miscellaneous publications, bearing on the Lower Delta and its geological questions, as well as a comprehensive list of maps of that portion of Louisiana.

BULLETIN CONTAINING LAWS RELATING TO MINERALS AVAILABLE FOR DISTRIBUTION

The revised edition of the bulletin containing Conservation Laws in Relation to Minerals, including amendments enacted at the regular session of the Louisiana Legislature of 1936, is now available for distribution by this Department. This volume includes the laws now in force dealing with the development, proration and conservation of the mineral resources of Louisiana. Certain sections of the various mineral laws have been amended, and these amendments are arranged in their proper places under the various acts. This bulletin edited and indexed by N. E. Simoneaux and C. K. Moresi contains a subject index arranged under the following major divisions: drilling and well completion; waste and damage; production; transportation and purchase; storage; processing and refining; records and reports, and geological survey.

Anthropological Study No. 2 Will Be Available for Distribution During the Early Part of 1937

Anthropological Study No. 2, the second of the series of bulletins being published by the Louisiana Department of Conservation on the archeology of the State, is now in press and will be available during the early part of 1937. The first bulletin, "Ceramic Decoration Sequence at an Old Indian Village Site near Sicily Island, Louisiana," by J. A. Ford of the School of Geology of Louisiana State University, was available in 1935.

Study No. 2, "Analysis of Indian Village Site Collections from Louisiana and Mississippi," by J. A. Ford, is an attempt to supply a time scale or chronology for the mound builder remains found in Louisiana and Mississippi by demonstrating the changes that have occurred in the styles of decorating pottery. Broken fragments of pottery vessels gathered from the trash dumps of the old villages provide the material used as a basis for this analysis.

Marked differences of decoration styles provide the evidence for dividing the occupation of the mound-building Indians into three time periods. The latest period is connected with the beginning of white men's history in the Lower Mississippi Valley by the presentation of material from the sites of villages that are described by the French explorers who visited the country early in the eighteenth century. The tribes whose ceramic styles are thus identified are the Choctaw in southern Mississippi; the Natchez, near the present town of that name; the Tunica and associated tribes on the lower Yazoo River; and the Caddoan tribes in northwestern Louisiana.

The Indians who immediately preceded those found in the country by the first explorers are unknown to history and can be described only through the remains that they have left. Two distinct groups of types or complexes of pottery were in the region at this time. Along the Yazoo River in Mississippi and extending north and east were the peculiar styles known as the "Deasonville complex." In Louisiana the prevailing modes formed what is called the "Coles Creek complex."

The earliest time period for the area is marked by only one widespread complex. The styles of this period form what is known as the "Marksville complex" named from a type site located near Marksville, Louisiana. Apparently this material represents the time of the first invasion of the Lower Mississippi Valley by Indians with the cultural traits of agriculture, mound building, and pottery making.

The time scale developed in this bulletin is essential to the study of Lower Mississippi Valley pre-history. It will serve as a measuring stick by means of which all the discoverable evidence of the mound-building Indians may be arranged in proper sequence. Without such a scale, archeology would be in about the same condition as history would be if all dates were deleted. Under this absurd condition it is conceivable that history might place the campaigns of Julius Caesar as events in the recent World War.

Study of Cap Rock and Salt of Louisiana Salt Domes Will Be Complete in Latter Part of 1937

The petrographic study of cap rock and salt of the Louisiana salt domes, which was reported upon by Ralph E. Taylor in the October, 1936, issue of *Louisiana Conservation Review*, is being continued by him at the School of Geology of Louisiana State University. This work had been carried on by Mr. Taylor during the past summer in the laboratories of the Freeport Sulphur Company, Grand Ecaille, Plaquemines Parish. To date, over 200 thin sections of cap rock have been examined, and at least 100 more will be studied before the work is completed. Many of these thin sections are of sulphur-bearing cap rock, obtained from well cores taken at Jefferson Island, Iberia Parish, and Grande Ecaille (Lake Washington), Plaquemines Parish. As much material as possible has been selected for study from the "transition zone" between the sulphur-bearing cap rock and the anhydrite cap rock, and considerable evi-

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dence bearing upon the origin of sulphur is being obtained. Recently, equipment for the making of thin sections has been installed at the School of Geology, which will allow the preparation of additional sections as they are needed.

In addition to the thin sections, water-insoluble residues of salt from some 20 salt domes have also been studied petrographically. These are being studied in order to determine the relation of the salt to the anhydrite. It is planned to complete the study of cap rock and salt in September, 1937.

SURVEY OF NATCHITOCHES AND RAPIDES PARISHES BEING MADE BY RESEARCH DIVISION

Mr. Justin Rukas, recently appointed Assistant Geologist of the Research Division of the Geological Survey, has started preliminary work on the Geology of Natchitoches and Rapides Parishes. Mr. Rukas will have charge of a field party during the summer of 1937.

Lying in the central part of the State, these Parishes have many Tertiary formations exposed at the surface. The Angelina-Caldwell flexure crosses Natchitoches Parish. The recently discovered Cheneyville oil field is located in Rapides Parish. These Parishes lie west of Winn and Grant Parishes which are being mapped at the present time by Mr. Huner and Dr. Fisk.

WORK BEGUN ON GEOLOGICAL REPORT OF BIENVILLE AND JACKSON PARISHES

Dr. R. Dana Russell, Assistant Professor of the School of Geology of Louisiana State University, has begun a study of the geology of Bienville and Jackson Parishes. During the summer of 1937, Dr. Russell will be in charge of a field party surveying these Parishes.

Bienville and Jackson Parishes lie in the north central part of the State and are bounded on the south by Winn and Caldwell Parishes, which are being mapped by Mr. Huner, and by Natchitoches, which will be studied by Mr. Rukas. Cretaceous and Tertiary formations are exposed at the surface. A number of salt domes are present in Bienville Parish, and two gas fields, Lake Bisteneau and Driscoll.

NO MAPS IN A MAPPING AGE

(Continued from Page 20)

We have been mapping the country in a more or less haphazard way for many decades, but funds devoted to mapping have been scarce, and today we find that no more than 47 per cent of the United States is covered by maps that show elevations and slopes. More than half of those maps were made so many years ago, when demands were on a simpler scale, that they are of little or no value now. They must be made over. We should not blame the early map-makers. About all they were attempting to do was to show the general character of the country. They met the needs of their own times; but the needs of today are more exacting and therefore the maps must be of higher grade.

The time has come for our people to wake up and to make a complete inventory of their natural resources and then to make plans that will enable them to use these resources in a rational way. Let us stop thinking that all our energies should be employed in collecting natural resources and using them up as fast as possible. By working in that manner we are destroying the potential wealth of our country. Let us devote at least some of our energies to finding out what natural resources we have. Let us make maps so that we can discover what we have and how we can use it.

If we should consider the cost of maps in human energy rather than in dollars, we would see that we could well afford to put to work on the mapping of the country as many persons as could be employed. A plan has been made for completing the topographic mapping of the country within ten years. Whether this plan will be put into effect is not known. With so many engineers available for employment, now would be the ideal time for starting a great mapping program. They would be kept on professional work; their morale would be maintained; and they would be better engineers as the result of having had intensive training in what may be called higher surveying and mapping. We are working without maps in a map-minded era. It is a condition that is unfortunate and it should be remedied.

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HOW YOU CAN BECOME A NATURE GUARDIAN

YOUR PART

Consult your teacher.

Ask that the purpose and plans of the Nature Guardian Club be explained to you and the class.

Ask for an application card.

Get a responsible person to indorse it, after proving that you fully understand the duties of a Nature Guardian.

Sign the application and mail the card postpaid, or give to your teacher, to send with cards from all the class.

OUR PART

We send the application card.

We send you a handsome badge, a certificate of membership, Nature Guardian pamphlets, and other literature.

This is all free, and is carried on with the purpose of instilling in the children's minds a knowledge of Louisiana's wild life and a thorough understanding of its economic value to the State.

It also aims to develop individual humanitarianism. Even within this short time an amazing improvement has been made in the mental attitude of our young folks toward the conservation and protection of Louisiana's natural resources.

EDITORIAL

My Dear Guardians:

Each year a great deal of adverse criticism is expressed about the length and regulations of the open hunting season. Many sportsmen seem to take as a personal affront the efforts made to protect and perpetuate the game life of the State and Nation.

Laws have been passed in Louisiana that allow hunting only in the fall and winter season when the young are grown, and that plainly specify the bag limit. Our hunters may kill one deer (buck) a day, and only five a season. Of course, does and fawns are always protected. The shooting of bears is restricted to one a day and to five a season. Our woodcock season is for one month only, and the daily bag limit is only four. This bird has been called "The Prince of Gamebirds" and should be safeguarded as much as possible, or it will soon be extinct. So scarce have wild turkeys become that Louisiana has declared a closed season for them for five years. More plentiful game birds and animals have a longer open season.

If we did not protect the wildlife of forest and field from thoughtless and selfish hunters, and especially from those who sell such creatures in open market, there would soon be little or no game to hunt.

There are many reasons why our game birds and animals are waging a losing fight against depletion if not against actual extinction. Some of these are the gradual curtailment of wildlife areas, the increase in the number of hunters, and the greater power, accuracy and range of our modern hunting weapons.

Hunting is such popular sport in Louisiana that the average man willingly pays the one dollar license that permits him to hunt legally. The State fishing license is also one dollar. For non-residents the license fee is higher. These licenses must be bought each year. The money obtained from such fees goes to the State Conservation Department and is used to finance general conservation work.

It is right and just that every effort should be made to protect game. It is a heritage that belongs to future generations as much as it does to the present one.

Game and bird refuges help to increase wildlife. Land owners can do much by prohibiting hunting and trespassing, by protecting and feeding game birds, and by guarding them from cats, tramp dogs and certain hawks.

Cover for game is destroyed by grass, woods and field fires. In spite of warnings and instructions given by fire wardens, home demonstration agents and conservation agents, many farmers continue to "burn off" their fields each spring.

In communities where the woods and fields are not burned over, rabbits, squirrels and game birds increase rapidly in number.

Gerrard Harris, in his "Elements of Conservation", says: "All that the wildlife of woods and fields needs in order to increase is a chance. By prohibiting hunting of any sort for several years it is possible for landowners to provide a fair supply of game on their premises if there is food in plenty, water, and no burned over areas. Then, hunted in moderation, the game will continue to thrive."

So, my dear Guardians, you see that there are sound reasons for the game laws of our State and Nation. Uphold them yourselves, and use your influence to have others uphold them, and we shall continue to have an abundance of game life in Louisiana for many years to come.

A happy New Year for all of you, is the wish of the

EDITOR.

And now for our letters:

1015 Railroad Ave.,
Morgan City, La.,
December, 1936.

DEAR EDITOR:

As a lover of all beautiful things that Nature has given us, I am asking for a card and a pin. I shall keep it always, for I shall consider it an honor to show it to my friends and classmates.

I am a senior now at St. Mary's High School. The subjects I enjoy most are American Democracy and Biology.

Please send me any literature that you have pertaining to Biology, particularly, for I am very much interested in that subject.

With best wishes for all the Guardians.

HELEN MAE WATSON.

We are very glad to hear from Helen, and hope she will continue to love Nature. A delight in childhood, a pleasure in youth, a love of nature becomes a positive solace as we grow older.

And here is a fine poem from James Randon. We think all the Guardians will agree with James.

LOUISIANA NATURE GUARDIANS

We are a useful band,
The happiest in all the land;
We try to keep our promise true
As every Guardian should do.

We guard the birds that fly above
And all our woodsy creatures love;
We watch the forests and the flowers
And all the beauty of the bowers.

We study Nature in our schools,
And try to learn about the rules
For keeping all our lowly friends
In safety till this old world ends.

Many interesting letters came to my desk from Breaux Bridge. I enjoyed them all the more because I used to teach in the high school there, and many of the names were quite familiar to me. Geraldine Hebert sends this letter, typical of many others that I received from the same school. Sorry that I cannot print all of them:

DEAR EDITOR:

I am interested in the birds of Louisiana. I have read some of your magazines and enjoyed them very much. I am a girl thirteen years old, and wish to join your Club. Please send me an application card and some literature.

Yours truly,

GERALDINE HEBERT.

Louis Roy, a Breaux Bridge boy, wishes to correspond with some of our members. His address is Route No. 2, Breaux Bridge, La. I hope that some of the Guardians will send him welcoming letters.

New Orleans, La.,
January 16, 1937.

DEAR EDITOR:

Let us all congratulate our new Conservation Commissioner, Honorable William G. Rankin. Mr. Rankin, we are all your little army, and you are our new commissioner, and we Guardians stand behind you at all times, so depend on us!

To all the staff of the Conservation Department we wish a bright and prosperous New Year.

Your Old Club Members,

PATRICK, ANTHONY
AND GERALD BREAUX.

Patrick, Anthony and Gerald are old friends. We are always glad to make room for their letters.

Here is a little poem from Mellie Harris, who lives where the song birds love to build their nests:

CHRISTMAS BIRDS

The weather was mild for Christmas time,
The sun shone bright and warm;
The birds were singing all around,
Safe and free from harm.

I wonder if they thought that Spring
Had come so soon this year;
They must have, 'cause their happy songs
Were full of joy and cheer.

I saw a pair of mockingbirds
Nest building in an oak;
I only hope Jack Frost won't nip
Their babies for a joke!

Here is another class that seems to enjoy the study of biology. Melba Buber, from Belle Chasse, writes as follows:

DEAR EDITOR:

The members, twenty in number, of the biology class of the Belle Chasse High School wish to become Louisiana Nature Guardians. Please send us application blanks so that we may join the Club.

Very truly yours,

MELBA BUBER.

We hastened to send the cards for we certainly have a place for twenty fine new Guardians.

Here comes a teacher asking admission for her pupils:

Springhill, La.,
December 1st, 1936.

DEAR EDITOR:

We have been studying about nature and wildlife in my classroom. I told my pupils about the Louisiana Nature Guardian Club and they have expressed a desire to join.

Will you please send me application cards for the entire class? I have thirty-eight pupils.

Thanking you, I am,

(Miss) AUDREY HORTMAN, *Teacher.*

This old owl showed his good sense. We could all take a lesson from him:

THE WISE OLD OWL

A wise old owl lived in an oak,
The more he saw the less he spoke;
The less he spoke the more he heard—
Why can't we be like that wise bird?

BIRD DAY

Bird Day this year will be celebrated on Friday, May 14, when most of our Louisiana birds will be nesting. Bird programs should be arranged so that all Nature Guardians will observe this special day devoted to the birds.

Please send in your letters and poems. We may not have room to use all of them, but we like to get them for they tell us what our Guardians are doing to help the great work of conservation.

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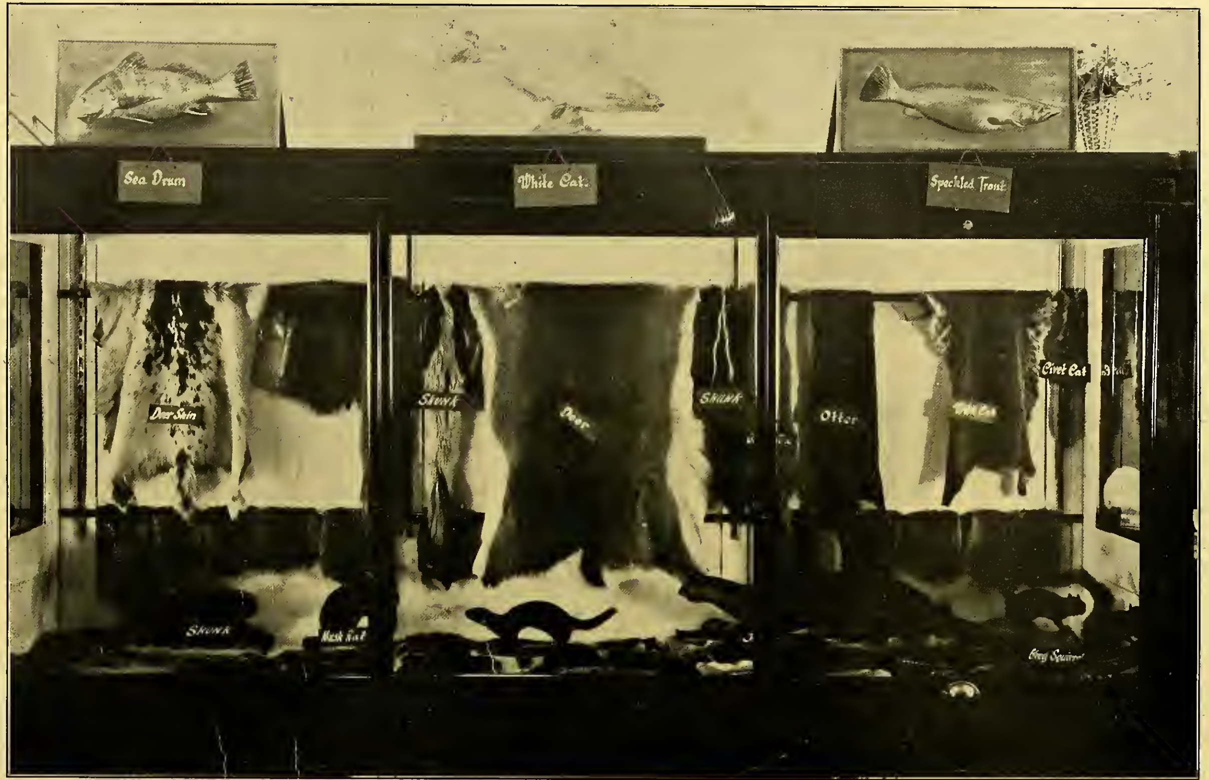

An Exhibit of Louisiana Fur Bearers in the Department of Conservation Museum.

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